

# Course Outline



- Tableau Fundamentals
- Connecting to and Preparing Data
- Exploring Data
- Managing, Sorting, and Grouping Data
- Saving, Publishing, and Sharing Data
- Filtering Data
- Customizing Visualizations
- Creating Dashboards in Tableau
- Creating Stories in Tableau

# Tableau Fundamentals



- Overview of Tableau
- Navigate and Configure Tableau



# Topic A

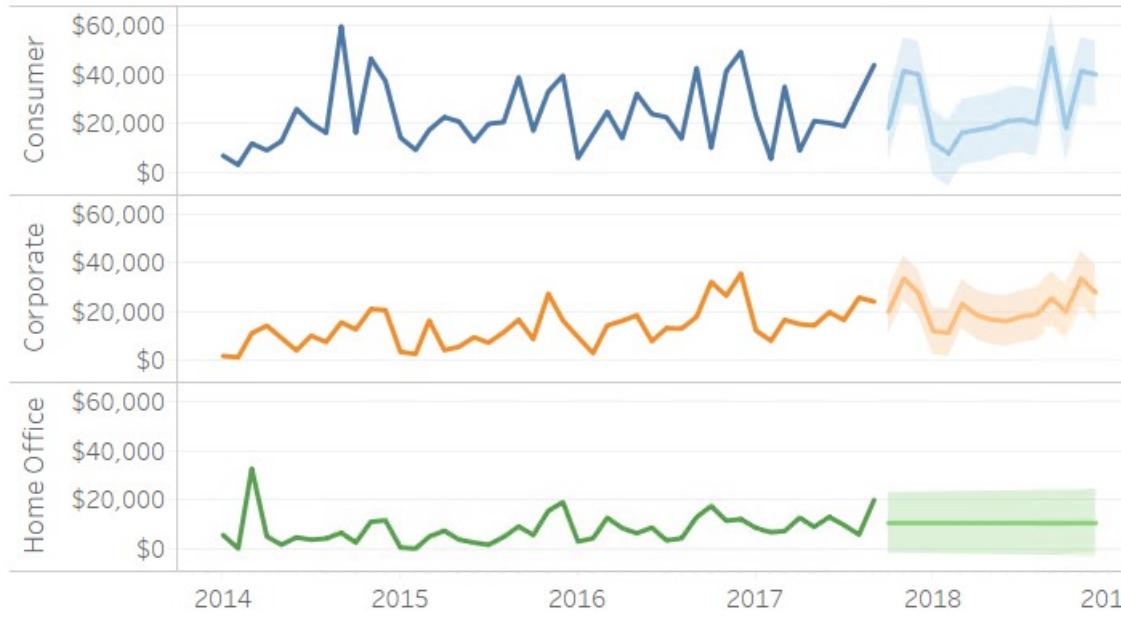
## Overview of Tableau

# Data Visualization



**Data visualization:** Using visual elements to analyze, find patterns in, and report insights gleaned from data.

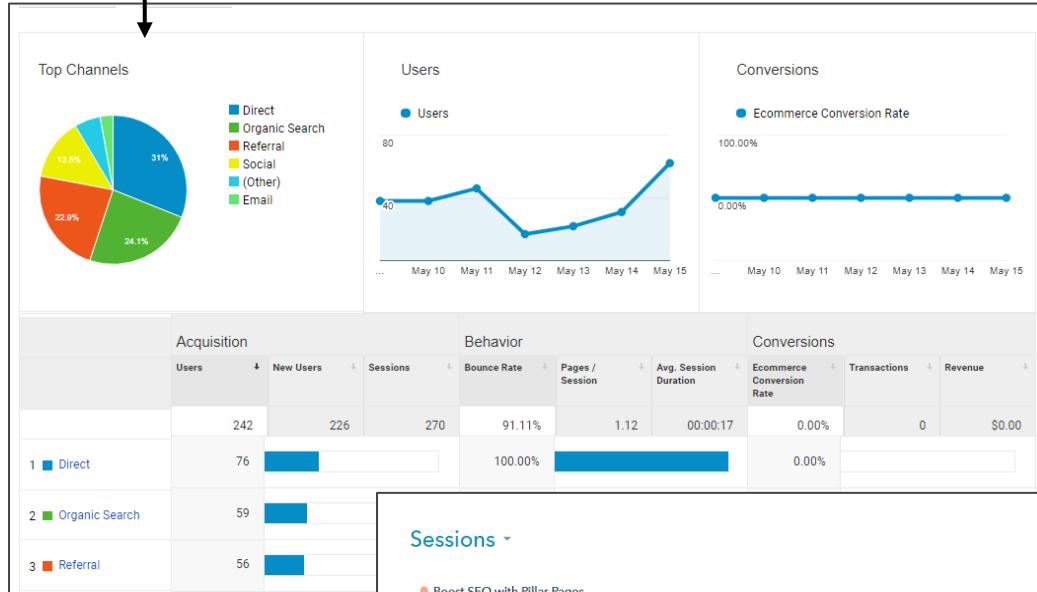
Sales Forecast



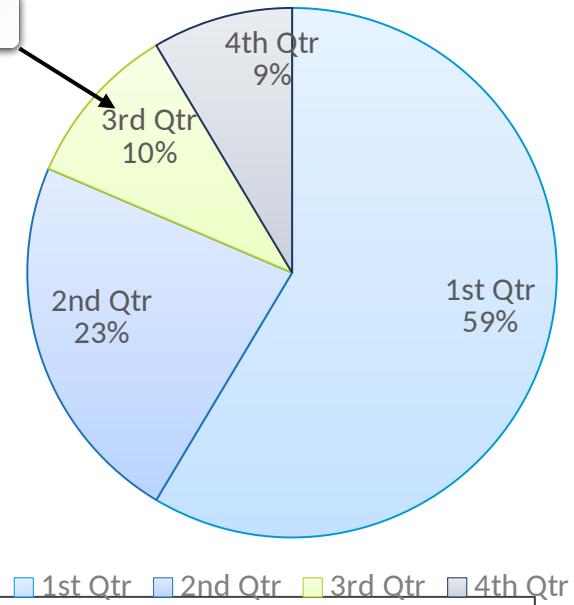
# Data Visualization Use Cases



Google Analytics report

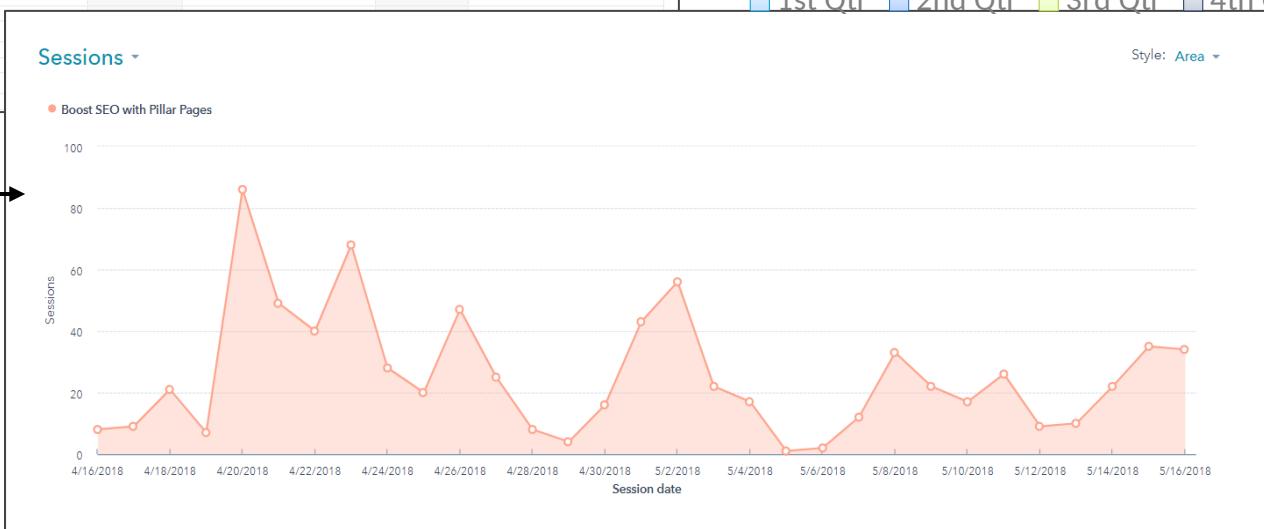


Excel chart



1st Qtr 2nd Qtr 3rd Qtr 4th Qtr

HubSpot report





## Excel / Google Sheets

- Capture and store data.
- Show data in tabular format.
- Store data in cells, which can be manipulated through formulas.
- Create some visualizations:
  - Charts
  - Graphs
  - Pivot tables
  - Etc.

## Tableau

- Connect to over 90 types of data sources.
- Create a variety of visualizations.
- Combine data from different sources to create complex visualizations.
- Filter data.
- Run calculations on data.
- Store and share configuration information about data connections and visualizations.
- Respond to natural language questions about data.

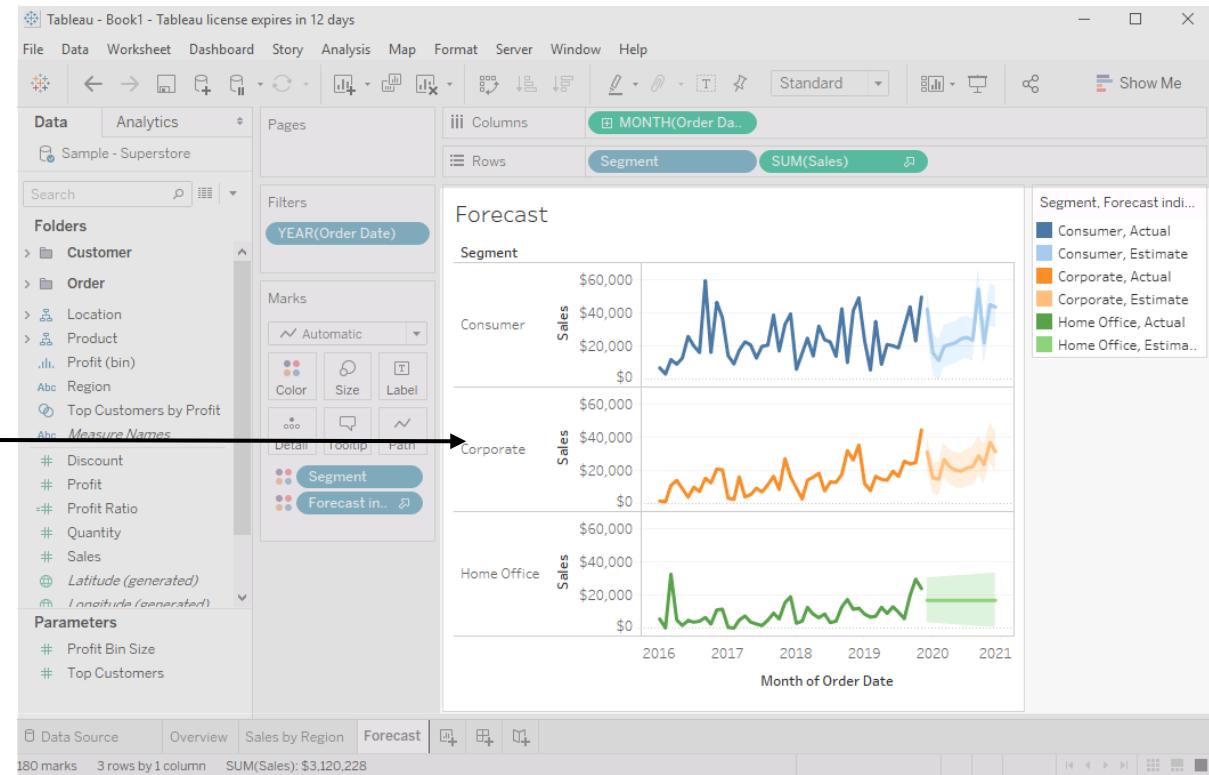
# The Viz



**The viz:** A Tableau term that is short for "The Visualization." It refers to the visualization you are currently working on in Tableau.

**Tableau Desktop  
2020.2 User  
Interface**

**The Viz / View**





- VizQL is a visual query language developed by Tableau and used in the background in Tableau software.
- VizQL allows you to start analyzing data without the need to code.
- As you adjust elements in the viz, VizQL translates those actions into data queries and modifies the view to express that data.
- VizQL allows you to start analyzing data more quickly.
- VizQL allows for a number of different visualizations that can help expose insights hidden deep within data sets.
- VizQL supports a more natural approach to analysis, matching how people progress through data analysis.
- The viz evolves in real-time with you as you change data elements as questions and answers present themselves during analysis.

# Tableau Versions



The most recent version is 2020.2

Version	Description
Reader	A free tool that allows users to open and interact with Tableau visualizations, apply filters, and drill into data.
Desktop	Business software that can connect to a wide array of data sources for exploring data, performing data analysis, and preparing visual data reports.
Prep	A tool designed to help get data analysis started more quickly by helping analysts combine, shape, and clean data for analysis. Tableau Prep comprises two products: Prep Builder and Prep Conductor.
Server	For enterprise-level sharing of data sources and workbooks hosted on an internal server.
Online	For enterprise-level sharing of data sources and workbooks hosted in the cloud.
Tableau Mobile	A mobile version of the Tableau Reader. It's available for iOS and Android.

# Licensing



License	Description	Cost per user, per month
Viewer	Provides access to view visualizations published in your organization.	\$12 (100 user minimum)
Explorer	Provides more features and allows access to data sources published in your organization. Explorers can create visualizations using Web authoring.	\$35 (5 user minimum)
Creator	Includes a license to Tableau Desktop and Tableau Prep. You also choose a hosting license, either Tableau Server or Tableau Online.	\$70

# Common Tasks



- Connect to data sources such as spreadsheets, databases, and online data repositories that have data that needs to be analyzed.
- Prepare data to be visualized in Tableau by cleaning up headers, columns, null values, and other data artifacts.
- Explore data to find patterns, trends, and insights.
- Perform deep data analysis to answer questions.
- Create visualizations in the form of reports and dashboards to provide updates to peers, managers, executives, clients, and the public.
- Create workbooks and worksheets to share with team members to allow them to explore data sets.
- Tell stories with data. Join multiple data sources in Tableau to perform complex visualizations.
- Join multiple data sources in Tableau to perform complex visualizations.

# Types of Data Connections

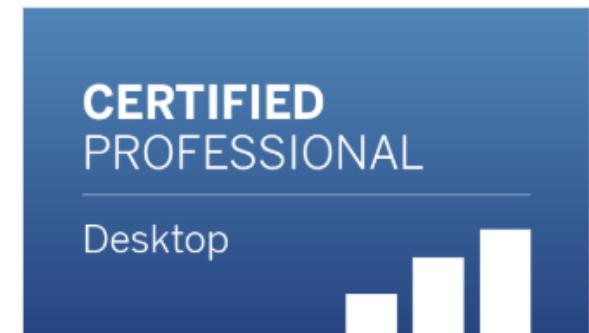
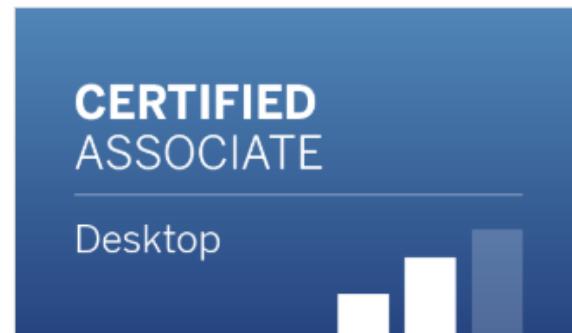
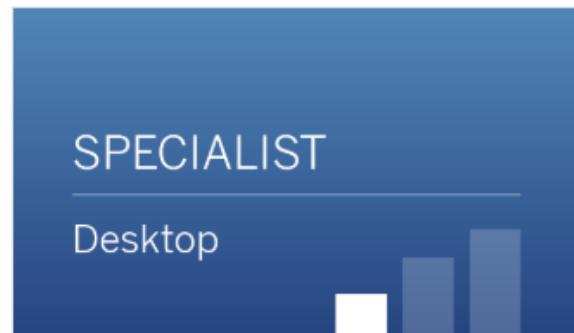


- |                                |                                  |  |  |
|--------------------------------|----------------------------------|--|--|
| • Actian Matrix*               | • Hortonworks Hadoop Hive        | • Microsoft SharePoint Lists                           | • SAP HANA   |
| • Actian Vector*               | • HP Vertica                     | • Microsoft Spark on HDInsight                         | • SAP Sybase ASE*  |
| • Alibaba AnalyticDB for MySQL | • IBM BigInsights                | • Microsoft SQL Server                                 | • SAP Sybase IQ*   |
| • Alibaba Data Lake Analytics  | • IBM DB2                        | • Microsoft SQL Server PDW                             | • SAS Files  |
| • Alibaba MaxCompute           | • IBM PDA*                       | • MonetDB  | • ServiceNow ITSM  |
| • Amazon Athena                | • Impala                         | • MongoDB  | • Snowflake  |
| • Amazon Aurora                | • JSON files                     | • MongoDB BI   | • Spark SQL  |
| • Amazon Elastic MapReduce     | • KML files                      | • MySQL  | • Splunk*  |
| • Amazon Redshift              | • Kognitio                       | • OData  | • SPSS Files   |
| • Anaplan                      | • Kyvos                          | • Oracle   | • Tableau Data Extract   |
| • Apache Drill                 | • LinkedIn Sales Navigator       | • Oracle Eloqua  | • Teradata   |
| • Aster Database               | • MapInfo Interchange Formats    | • Oracle Essbase*                                      | • Teradata OLAP Connector*                                     |
| • Box                          | • MapInfo Tables                 | • PDF files  | • TIBCO® Data Virtualization*                                  |
| • Cloudera Hadoop Hive         | • MapR Hadoop Hive*              | • Pivotal Greenplum Database                           | • Text files—comma separated value (.csv) files                |
| • Cloudera Impala              | • MariaDB                        | • PostgreSQL   | • Databases and applications that are ODBC 3.0 compliant*      |
| • Databricks                   | • Marketo                        | • Presto   | • Tons of web data with the <a href="#">Web Data Connector</a> |
| • DataStax Enterprise*         | • MarkLogic                      | • Progress OpenEdge*                                   |  |
| • Denodo                       | • MemSQL                         | • Qubole   |  |
| • Dropbox                      | • Microsoft Access*              | • Quickbooks Online                                    |  |
| • Esri ArcGIS Server           | • Microsoft Analysis Services*   | • R files  |  |
| • Exasol*                      | • Microsoft Azure Data Warehouse | • Salesforce.com, including Force.com and Database.com |  |
| • Firebird                     | • Microsoft Azure DB             | • SAP BW   |  |
| • GeoJSON                      | • Microsoft Excel                |  |  |
| • Google Ads                   | • Microsoft OneDrive             |  |  |
| • Google Analytics             | • Microsoft PowerPivot*          |  |  |
| • Google BigQuery              |                                  |  |  |
| • Google Cloud SQL             |                                  |  |  |
| • Google Sheets                |                                  |  |  |

\* Available for Windows only



## Tableau Desktop Exams



## Tableau Server Exams





## Discussing the Use of Tableau Data Visualization



# Topic B

## Navigate and Configure Tableau

# Elements of the Tableau UI



The diagram illustrates the various components of the Tableau User Interface (UI) through callout boxes and arrows:

- Menus and Toolbars**: Points to the top navigation bar which includes File, Data, Worksheet, Dashboard, Story, Analysis, Map, Format, Server, Window, Help, and a Show Me button.
- Cards**: Points to the top section of the interface where data cards are displayed, such as "MONTH(Order Da..)" and "SUM(Sales)".
- Shelves**: Points to the shelf area where data is mapped to the visualization, specifically "Segment" and "SUM(Sales)".
- Data and Analytics Pane**: Points to the left sidebar containing the Data tab, Analytics dropdown, Sample - Superstore, Folders (Customer, Order, Location, Product, Profit (bin), Region, Top Customers by Profit, Measure Names), Marks (Automatic, Color, Size, Label, Detail, Tooltip, Path, Segment, Forecast in...), Parameters (Profit Bin Size, Top Customers), and a summary row: Data Source, Overview, Sales by Region, Forecast, 180 marks, 3 rows by 1 column, SUM(Sales): \$3,120,228.
- Marks Card**: Points to the "Marks" section of the Data and Analytics pane.
- The Viz**: Points to the main visualization area showing three stacked area charts for Consumer, Corporate, and Home Office segments, grouped by Month of Order Date from 2016 to 2021. The Y-axis represents Sales in dollars.
- Legend**: Points to the legend on the right side of the visualization, listing categories and corresponding colors: Consumer, Actual (blue), Consumer, Estimate (light blue), Corporate, Actual (orange), Corporate, Estimate (light orange), Home Office, Actual (green), and Home Office, Estimate (light green).

# Dimensions (Discrete Data)



Tableau - Book1 - Tableau license expires in 12 days

File Data Worksheet Dashboard Story Analysis Map Format Server Window Help

Data Analytics

Sample - Superstore

Search

**Dimensions**

Folders

- > Customer
- > Order
- > Location
- > Product
- .ll. Profit (bin)
- Abc Region
- Top Customers by Profit
- Abc Measure Names
- # Discount
- # Profit
- =# Profit Ratio
- # Quantity
- # Sales
- Latitude (generated)
- Longitude (generated)

Parameters

- # Profit Bin Size
- # Top Customers

Pages

Columns MONTH(Order Da..

Rows Segment

Marks Automatic

Color Size Label

Detail Tooltip Path

Segment

Forecast in..

Forecast

Segment

Sales

Consumer

Corporate

Home Office

Month of Order Date

2016 2017 2018 2019 2020

180 marks 3 rows by 1 column SUM(Sales): \$3,120,228

# Measures (Continuous Data)



Tableau - Book1 - Tableau license expires in 12 days

File Data Worksheet Dashboard Story Analysis Map Format Server Window Help

Data Analytics

Sample - Superstore

Search

Folders

- > Customer
- > Order
- > Location
- > Product
- .ll. Profit (bin)
- Abc Region
- Top Customers by Profit
- Abc Measure Names

Measures

- # Discount
- # Profit
- =# Profit Ratio
- # Quantity
- # Sales
- Latitude (generated)
- Longitude (generated)

Parameters

- # Profit Bin Size
- # Top Customers

Pages

Columns MONTH(Order Da..

Rows Segment

SUM(Sales)

Forecast

Segment

Consumer

Corporate

Home Office

Sales

2016 2017 2018 2019 2020

Month of Order Date

Data Source Overview Sales by Region Forecast

180 marks 3 rows by 1 column SUM(Sales): \$3,120,228

The screenshot illustrates the creation of a forecast visualization in Tableau. The 'Measures' section is highlighted with a callout, showing metrics like Sales and Profit. The 'Segment' field in the Rows shelf is also highlighted. The resulting forecast dashboard displays sales trends for three segments over five years.

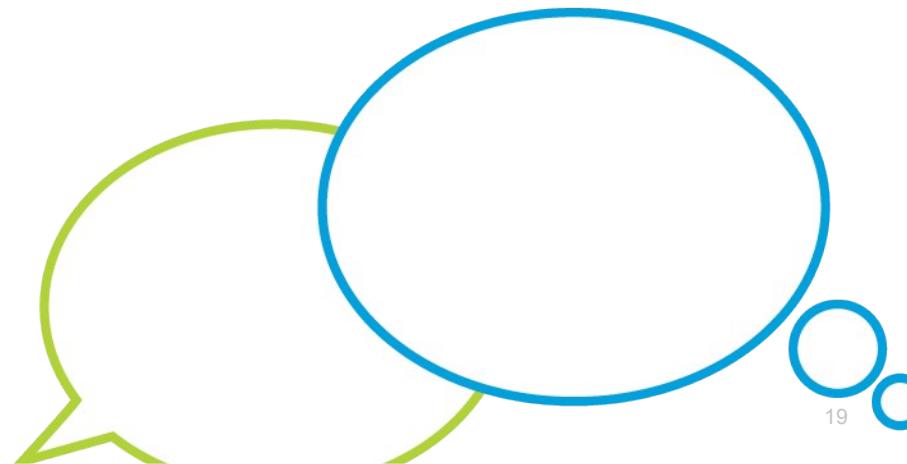


## Navigating the Tableau Interface

# Reflective Questions



1. What do you use now for data visualization and reporting?
2. How might you use Tableau in your company?



# Connecting to and Preparing Data



- Connect to Data
- Build a Data Model
- Save Workbook Files
- Prepare Data for Analysis



# Topic A

## Connect to Data

# Data Connection Options



- Tableau does not capture or store data
  - Similar to a front end to a data source
- You must connect Tableau to a data source before you can create a workbook in Tableau.
- A workbook retrieves the information from the data source for analysis and visualizations.
- A data source can be many types of files where data is stored.
- Create data source connections from within Tableau Desktop or Tableau Prep.
- Tableau prep is a separate tool included with the Tableau Creator license.

# Tableau Prep



Tableau Prep Builder - WorldIndicators

File Edit Flow Server Help Alerts (0) ⚠

global\_world\_i... → Clean 1

ConsumerPrice... → Years to Rows → Months --> Years → Clean Countries → Indicators+Indi... → Field Clean Up → Create Extract

100%

Field Clean Up 27 Fields 3K Rows Filter Values... \*\*\* 5 Recommendations Search

Changes (3)

#	CPI 736	#	Year 14	#	Country 150	#	Birth Rate 48	#	Business Tax Rate 448
null	15,000	null	2,003	null	Afghanistan	null	0.06	null	0.082
15,000	35,000	2,007	2,011	Albania	Algeria	0.083	0.084	Armenia	0.093
55,000				Aruba	Australia	0.107	0.11	Austria	0.113
				Azerbaijan			0.12		

# Data Source Connections



**File-Based Data Sources**

**Server-Based Data Sources**

**Saved Data Sources**

**Search for Data Sources**

**Connect**

- Search for Data
- Tableau Server
- To a File
  - Microsoft Excel
  - Text file
  - JSON file
  - Microsoft Access
  - PDF file
  - Spatial file
  - Statistical file
  - More...
- To a Server
  - Microsoft SQL Server
  - MySQL
  - Oracle
  - Amazon Redshift
  - More... >
- Saved Data Sources
  - Sample - Superstore
  - World Indicators

Search

- Action Matrix
- Action Vector
- Alibaba AnalyticDB for MySQL
- Alibaba Data Lake Analytics
- Alibaba MaxCompute
- Amazon Athena
- Amazon Aurora for MySQL
- Amazon EMR Hadoop Hive
- Amazon Redshift
- Anaplan
- Apache Drill
- Aster Database
- Azure Synapse Analytics
- Box
- Cloudera Hadoop
- Databricks
- Denodo
- Dropbox
- Esri ArcGIS Server
- Exasol
- Firebird 3
- Google Ads
- Google Analytics
- Google BigQuery
- Google Cloud SQL
- Google Drive
- Google Sheets
- Hortonworks Hadoop Hive

# Data Source Page



## Data source connection

## Canvas

### Orders (MyFootP...)

Connection  
Live

Extract

Filters  
0 | Add

Orders

Show metadata grid

Drag tables here to relate them. [Learn more](#)

Sort fields

Data source order

▼

Show aliases

Show hidden fields

1,000

rows

Show data grid

#	#	#	#	Abc	Abc
Orders	Orders	Orders	Orders	Orders	Orders
ID	E	Order ID	Order Date	Ship Date	Shipping Method
12037		20922	1/13/2017	1/15/2017	2 Day
12038		20922	1/13/2017	1/15/2017	2 Day
12039		20922	1/13/2017	1/15/2017	2 Day

Data grid (first 1,000 rows)

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6

# Live Data vs. Extracted Data



Connection	Description	Pros and Cons
<b>Live Connection</b>	These connections get data directly from the data source in real-time.	<b>Pros</b> <ul style="list-style-type: none"><li>Updates to data source are displayed in real-time.</li></ul> <b>Cons</b> <ul style="list-style-type: none"><li>Queries are only as fast as the database performance.</li><li>Performance can be impacted by connection speed and load on the database.</li></ul>
<b>Extract</b>	Snapshot of data of specific tables or fields to be included in the visualization.	<b>Pros</b> <ul style="list-style-type: none"><li>Optimized for aggregation.</li><li>Loaded into memory (faster).</li><li>Faster than live connections (especially for large and complex data sets).</li></ul> <b>Cons</b> <ul style="list-style-type: none"><li>It must be refreshed (manually or on a schedule) from the data source to show updates.</li><li>May potentially violate privacy laws.</li></ul>

# Guidelines for Connecting to Data



- Compare performance of live connections and extracts to determine which provide acceptable performance.
- Extracts generally have better performance than live connections.
- If accuracy requires data to be pulled in real-time, use a live connection.
- If data is sensitive in nature, use live connections so security is enforced when workbooks are opened.



## Connecting to Excel and Importing Data



# Topic B

## Build a Data Model



- The data model tells Tableau:
  - How the tables in the data source are connected to each other.
  - How Tableau should query the data source.
- Every data source you create has a data model.
- You build the structure of the data model by adding tables and creating or manipulating the relationships between them.
- Data models can be simple or complex.

# Relationships, Joins, and Unions



**Relationships:** Are created between two fields (called linking fields) in different tables or data sources. A relationship only exists between two data sources, and the data from each is combined so that each row contains columns of data from each table or source.



**Joins:** Similar to relationships, a join combines columns from one or more data sources. Joins aren't limited to two data sources and may represent multiple relationships and can include conditions which limit the scope of the data combined.

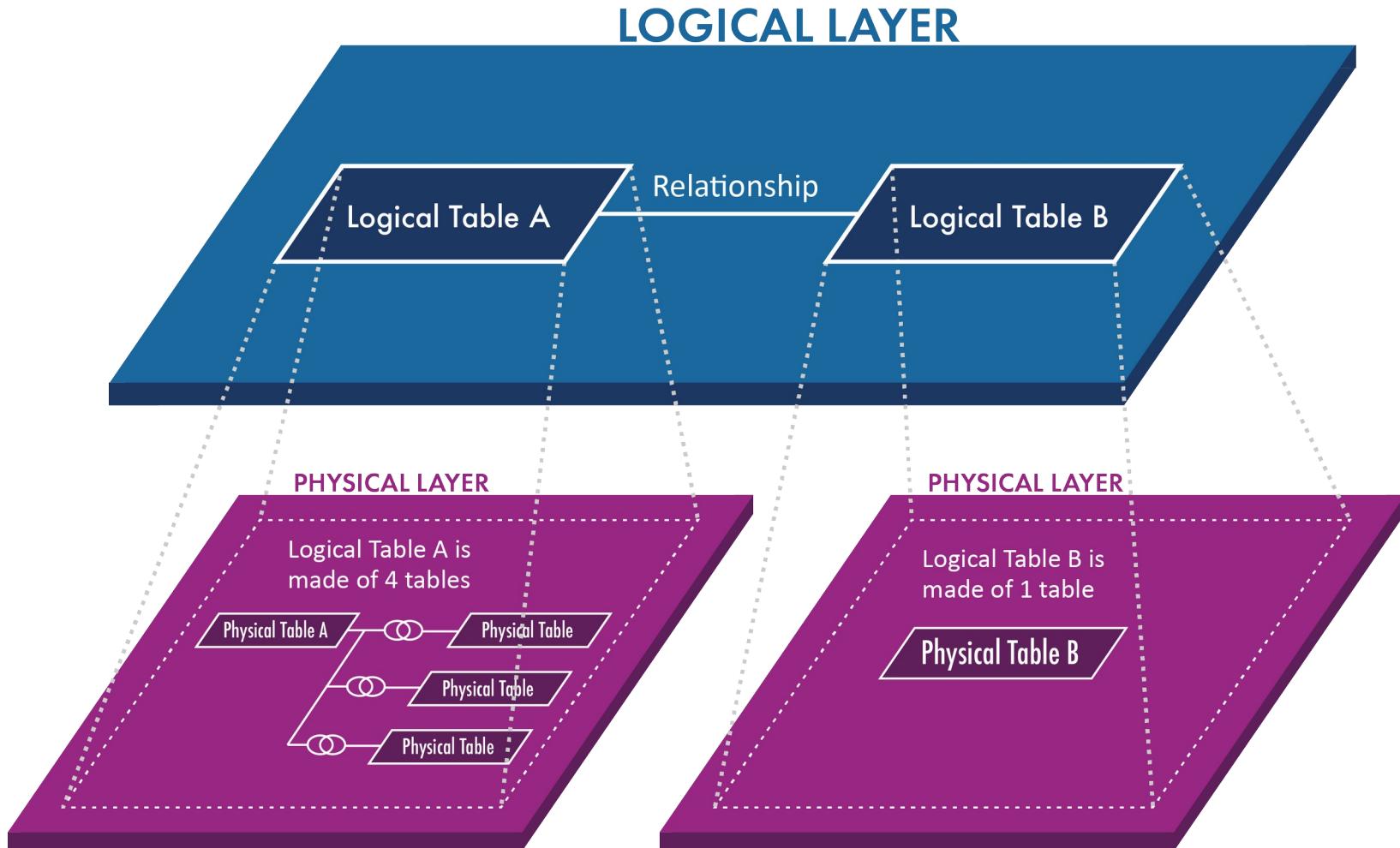


**Unions:** A union adds new rows to an existing table and can be thought of as something similar to a merge or update of a table.

# Logical vs. Physical Layer



## DATA MODEL



# Data Model Layers



- Tableau data model has two layers:
  - Physical, which supports connections through joins and unions.
  - Logical, which supports connections through relationships.
- Logical tables can be thought of as containers for physical tables.
- To better understand the benefit of this approach, you must understand the concept of normalized versus denormalized data:
  - Most data in data sources is normalized; that is, it is broken into multiple tables to reduce redundancy, and ensure consistency and data integrity.
  - Denormalized data has been combined into a single table in order to make data retrieval faster.

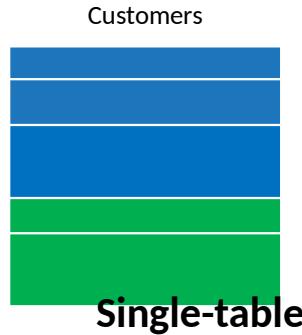
# Options for Building a Data Model



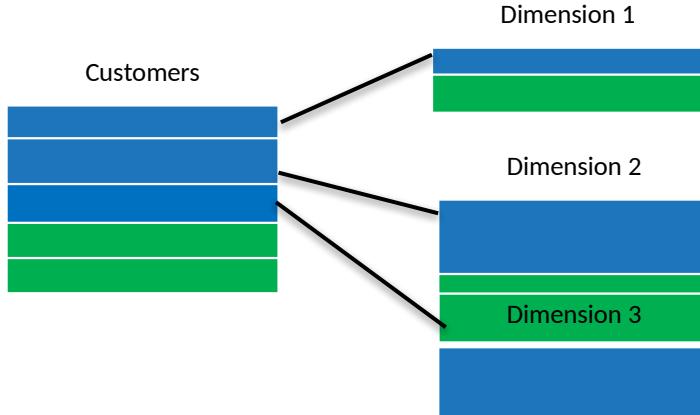
You can create the following types of models:

- **Single-table.** Add a single table from a data source. Use fields from that table in your analysis.
- **Single-source with additional tables.** From your single data source, add additional tables with a Join or Union.
- **Multi-table.** Add multiple tables at the logical layer that are related. Tableau will attempt to create relationships automatically.

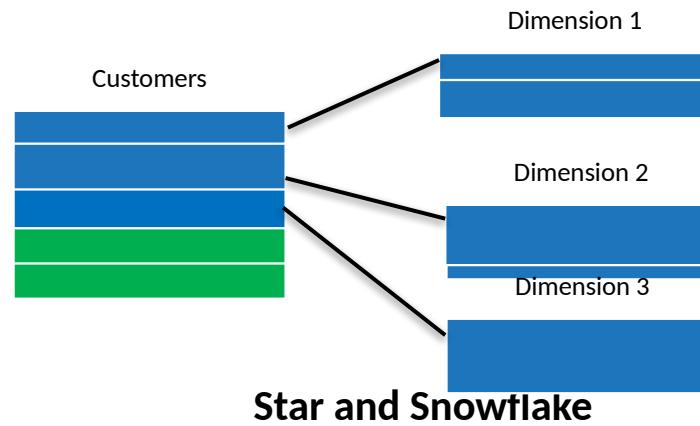
# Data Model Schemas Supported



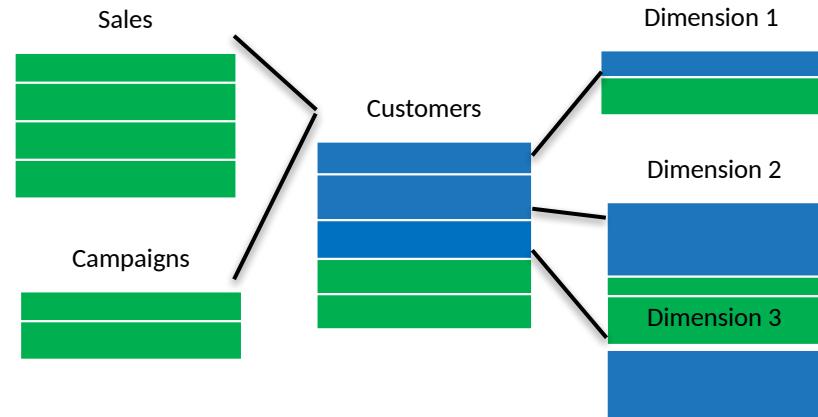
A single logical table containing a mix of dimensions and measures.



**Star and Snowflake with Measures in Multiple Tables**  
Connected tables contain measures or aggregations.



**Star and Snowflake**  
Often with measures in a central fact table, and dimensions in separate tables.



**Some Multi-fact Analysis**  
Analysis using multiple fact tables.

# Metadata Grid vs. Data Grid



**Metadata grid**

Field Name	Table	Remote Field Name
# ID	Orders	ID
# Order ID	Orders	Order ID
Order Date	Orders	Order Date
Ship Date	Orders	Ship Date
Shipping Method	Orders	Shipping Method
Customer ID	Orders	Customer ID
Customer Name	Customer	Customer Name

Information about the data such as field names and mappings to names at the data source.

**Data grid**

# Orders	# Orders	Orders	Orders	Orders
ID	Order ID	Order Date	Order Date	Ship Date
12037	20922	1/13/2017	1/15/2017	
12038	20922	1/13/2017	1/15/2017	
12039	20922	1/13/2017	1/15/2017	
12040	20922	1/13/2017	1/15/2017	
12041	20922	1/13/2017	1/15/2017	

The data.



- Hide fields to keep them from taking up space in the list of dimensions or measures.
- Rename fields so that the field names make more sense.
- Create hierarchies by dragging dimension fields on top of one another.
- Create folders to group and organize features, which can be helpful when connected to data sources that expose a lot of fields.
- Assign colors to fields by dragging the field onto the color object in the **Marks** card and setting a default color.
- Add comments to dimensions and measures.
- Sort fields and rows by data source or table or sort columns by clicking the **sort** button next to the column name.
- Set default properties for measures such as number format, and aggregation defaults such as Sum or Average.
- Add calculations to the worksheet that can be used in the visualization.

# Data Source Filters

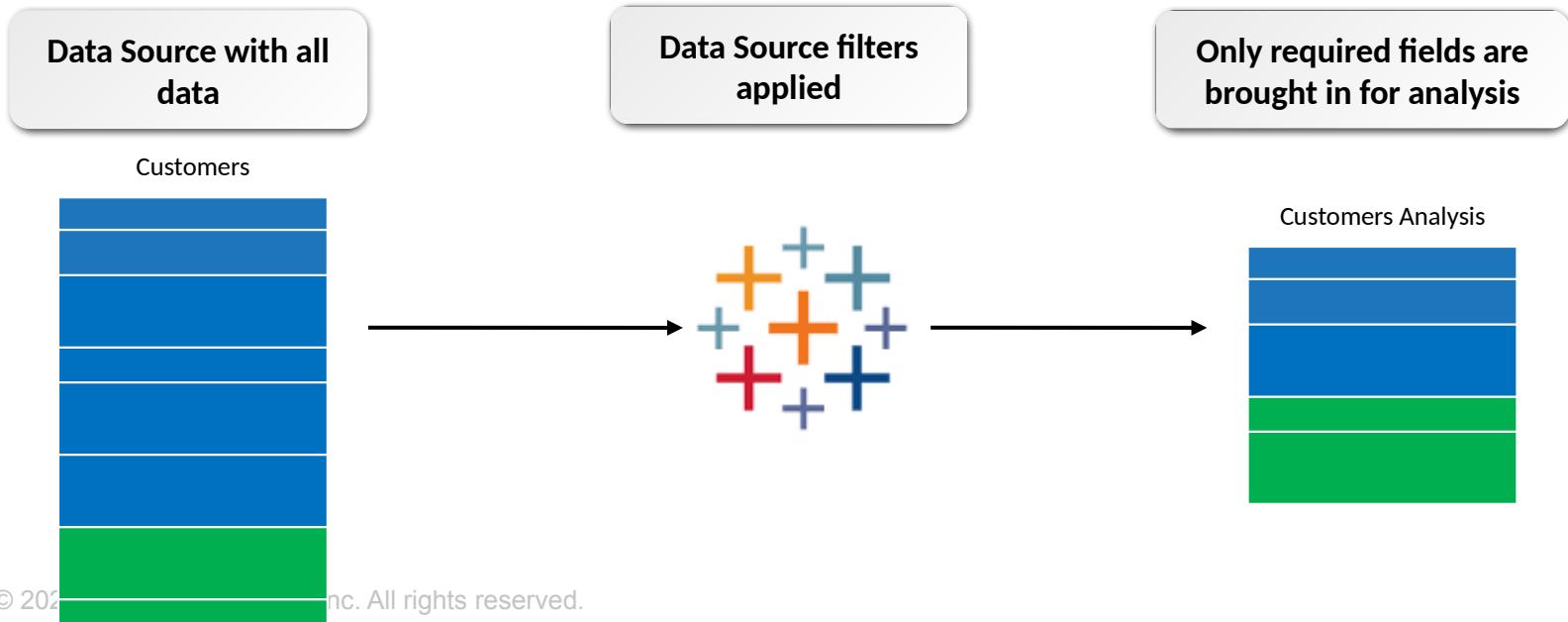


**Data source filters:** Filters data from the data source prior to bringing it into Tableau.

Restricting data users can see for security or privacy.

Removing unnecessary data by showing only the subset of data necessary for exploration, analysis, or reporting.

Improving performance with large data sets by reducing the amount of data processed by Tableau.





## Building a Data Model



# Topic C

## Save Workbook Files

# Workbook File Types



File Type	Description
Workbook (.twb)	This is a workbook file.
Bookmark (.tbn)	Bookmarks contain a single worksheet and are commonly used as a quick way to share a worksheet.
Packaged Workbook (.twbx)	This is a zip file containing a workbook and any required local external supporting files.

# Packaged Workbooks



Packaged workbooks contain:

- Background images
- Custom geocoding
- Custom shapes
- Local cube files
- Microsoft Access files
- Microsoft Excel files
- Tableau extract files (.hyper or .tde)
- Text files (.csv, .txt, etc.)



- By default, Tableau saves files in its default repository:  
\Documents\My Tableau Repository
- You can change the repository location from the **File** menu by selecting **Repository Location**.
- If you change the repository location, a new repository folder structure is created, but files are not moved from the previous repository.
- You must manually copy files or use a scripted process to move them.

# Exporting Previous Tableau Views and Workbooks



- You can export views and workbooks for use with previous versions of Tableau.
- You can also export individual views as images and import those images into other applications to create or enhance reports.
- You can also output to Microsoft PowerPoint.
  - You can output selected views, or sheets from a workbook or dashboard.
  - The exported views and sheets are created as static PNG images in the PowerPoint file.
  - If you export a story, each story point is exported as a separate slide.



## Saving Workbooks



# Topic D

## Prepare Data for Analysis

# Data Preparation Options



- You can potentially do some data preparation ahead of time by making a copy of the data:
  - But you can potentially cause issues if you remove fields on which other fields are dependent.
  - You also then have two copies of the data—the original data source and the modified copy.
- Also, you may not be able to easily prepare some data sources outside of Tableau, such as a relational database.
- Tableau offers features and tools that allow you to prepare data once data sources are connected.
  - The data preparation persists with the workbook.

# The Data Interpreter



The screenshot shows two views of the Microsoft Excel ribbon interface, specifically the 'Data' tab.

**Left Screenshot:** The 'Connections' section shows a connection named 'MyFootPrintSports\_Data' (Microsoft Excel). In the 'Sheets' section, there is a checkbox labeled 'Use Data Interpreter'. Below it, a note says: 'Data Interpreter might be able to clean your Microsoft Excel workbook.' This entire note area is highlighted with a red box.

**Right Screenshot:** The 'Connections' section shows the same connection. In the 'Sheets' section, the 'Use Data Interpreter' checkbox is checked, and the note below it has changed to: 'Cleaned with Data Interpreter' and includes a link: 'Review the results. (To undo changes, clear the check box.)'. This entire note area is also highlighted with a red box.

# Text Tables: Crosstabs



Orders (MyFootP...)

Connection: Live | Extract

Filters: 0 | Add

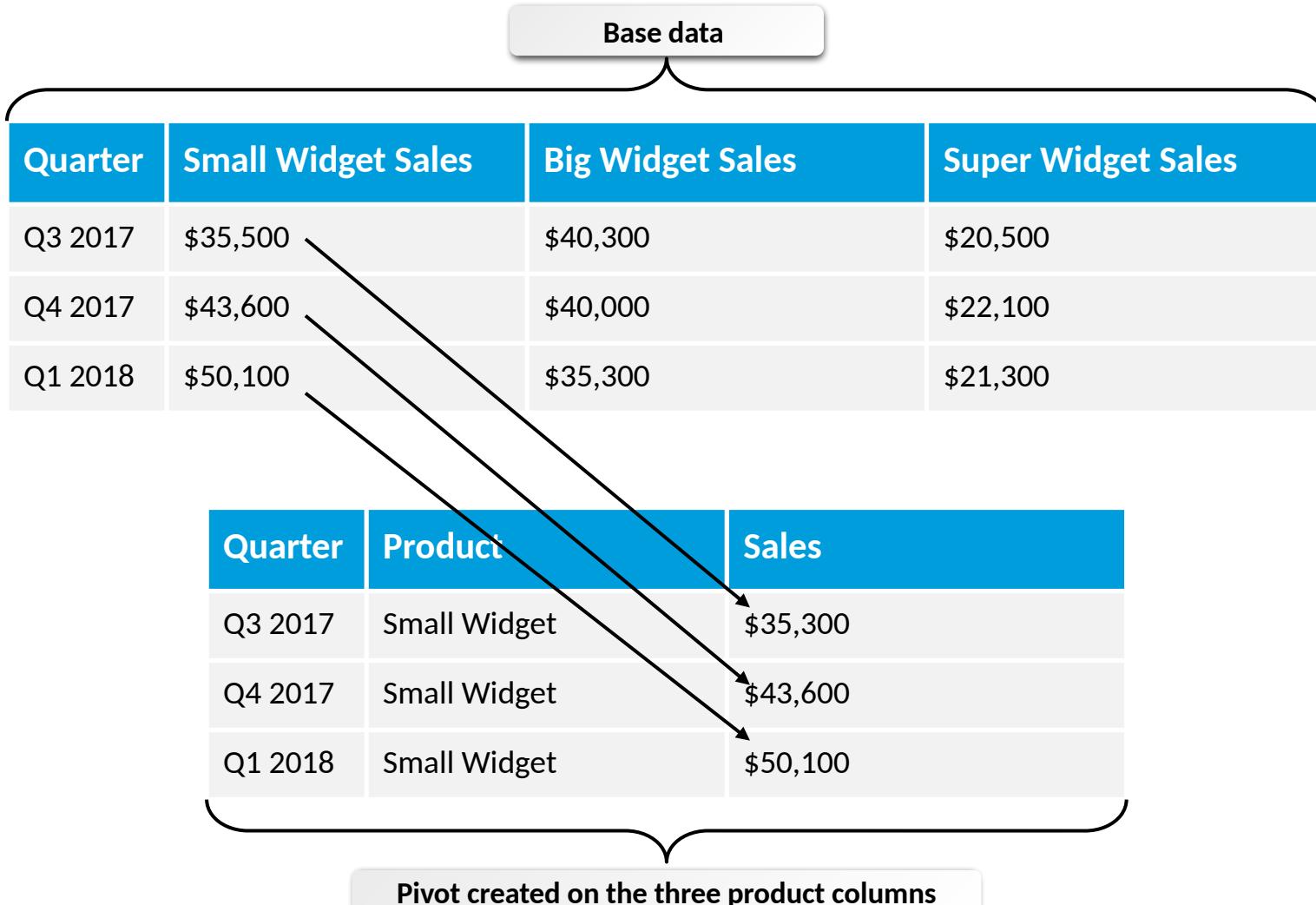
Orders

Need more data?  
Drag tables here to relate them. [Learn more](#)

Sort fields | Data source order |  Show aliases |  Show hidden fields | 1,000 rows

# Orders ID	# Orders Order ID	Orders Order Date	Orders Ship Date	Abc Orders Shipping Method	Abc Orders Customer ID
12037	20922	1/13/2017	1/15/2017	2 Day	S-122501
12038	20922	1/13/2017	1/15/2017	2 Day	S-122501
12039	20922	1/13/2017	1/15/2017	2 Day	S-122501
12040	20922	1/13/2017	1/15/2017	2 Day	S-122501
12041	20922	1/13/2017	1/15/2017	2 Day	S-122501

# Pivots



# Split Fields



A single field...

Address
<b>1234 SW Balsawood Ave, Greene City, RL 99999</b>

Becomes multiple fields that can be used for analysis.

Street Address	City	State	Zip
<b>1234 SW Balsawood Ave</b>	<b>Greene City</b>	<b>RL</b>	<b>99999</b>



A single field for product SKU...

Product SKU
<b>123-456-789-05252018-GREENWAY</b>

Becomes three fields that can be used for analysis.

Product ID	Sales Date	Shipping Facility
<b>123-456-789</b>	<b>05/25/2018</b>	<b>GREENWAY</b>

# Examine and Search Data



You can view data that is brought in through your flow to see the:

- Number of fields and rows.
- Size of the data set.
- If all the data has been processed or a sample of the data has been processed (for large data sets).
- The number of unique values.
- For date and numeric data, you can toggle views to see discrete or summarized versions of the values.

# Guidelines for Preparing Data for Analysis



- Consider how the data will be used.
- Set a clear goal for what that data should contain.
- Use familiar key structural components of the data source such as key fields and dependencies.
- Determine a sample size to use from large data sets.
- Document data preparation steps so that you can undo (or avoid on a second attempt) making changes that dilute or disconnect data or make it unusable.
- Spot check data occasionally as you make changes to ensure your data still meets the goal criteria.
- Remove unnecessary data that won't be used as part of analysis or exploration.
- Use the Tableau Prep tool to save time preparing data.

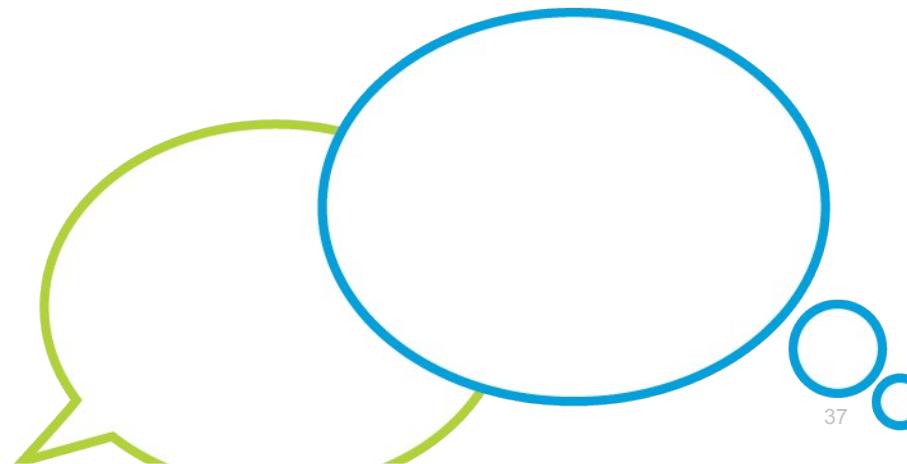


## Preparing Data for Analysis

# Reflective Questions



1. What data sources are you likely to connect to in your environment or organization?
2. What sort of data preparation do you anticipate needing to do for your data sources?



# Exploring Data



- Create Views
- Customize Data in Visualizations



# Topic A

## Create Views

# Options for Building Views



Drag dimensions and measures to shelves

Select data fields then select a chart type from Show Me

Double-click a field to add it to a shelf

Tableau - Book1 - Tableau license expires in 11 days

File Data Worksheet Dashboard Story Analysis Map Format Server Window Help

Data Analytics Sample - Superstore

Search Folders Product Category Sub-Category Manufacturer Product Name Profit (bin) Region Top Customers by Profit Measure Names Discount Profit Profit Ratio Quantity Sales

Parameters Profit Bin Size Top Customers

Pages Columns Sub-Category Rows SUM(Sales)

Sheet 4

Sub-Category

Sales

Sub-Category	Sales
Accessories	\$175,000
Appliances	\$110,000
Art	\$35,000
Binders	\$210,000
Bookcases	\$120,000
Chairs	\$340,000
Copiers	\$150,000
Envelopes	\$20,000
Fasteners	\$5,000
Furnishings	\$90,000
Labels	\$20,000
Machines	\$190,000
Paper	\$80,000
Phones	\$320,000
Storage	\$220,000
Supplies	\$50,000
Tables	\$210,000

For horizontal bars try  
0 or more Dimensions  
1 or more Measures

# Columns and Rows Shelves



Tableau - Book1 - Tableau license expires in 11 days

File Data Worksheet Dashboard Story Analysis Map Format Server Window Help

Data Analytics Sample - Superstore

Search Folders Location Product Category

Pages Columns Sub-Category

Rows SUM(Sales)

Filters Sheet 4 Sub-Category

Marks \$300,000

Columns shelf

Rows shelf

Show Me

A screenshot of the Tableau desktop application. The interface includes a top menu bar with File, Data, Worksheet, Dashboard, Story, Analysis, Map, Format, Server, Window, and Help. Below the menu is a toolbar with various icons. On the left, there's a sidebar with 'Data' and 'Analytics' tabs, a search bar, and a 'Folders' section containing 'Location', 'Product', and 'Category'. The main workspace shows a 'Pages' shelf with 'Sub-Category' selected, a 'Rows' shelf with 'SUM(Sales)' selected, and a 'Marks' shelf with a single data point labeled '\$300,000'. A 'Filters' shelf is also visible. To the right is a 'Show Me' panel displaying various visualization options. Two callout boxes with arrows point to specific shelves: one labeled 'Columns shelf' points to the 'Sub-Category' button on the Columns shelf, and another labeled 'Rows shelf' points to the 'SUM(Sales)' button on the Rows shelf.

# Types of Marks (Slide 1 of 2)



Mark	Description
Automatic	Tableau selects default mark types depending on the type of data placed as inner fields on the rows and columns shelves.
Bar	Creates a vertical bar chart.
Line	Creates a line chart.
Area	Creates a line chart with a color-filled area below the line.
Square	Creates a table filling in each cell with a color from a specific range.
Circle	Displays data as filled circles, allowing you to see where data falls in a range.
Shape	Displays data as one of 10 unique shapes in the view.

# Types of Marks (Slide 2 of 2)



Mark	Description
Text	Displays data as text.
Map	Displays data on a map by using geocoding to fill polygons or lines with color based on data.
Pie	Creates a pie chart showing percentages of data in relation to each other.
Gantt Bar	Creates a Gantt chart.
Polygon	Polygon view shows points connected by lines that enclose an area.
Density	Also called a heatmap mark, you use this mark to visualize patterns in data that is dense where many marks may be overlapping.

# Marks Card Configuration Objects



The screenshot shows the Tableau interface with the 'Marks' card configuration panel highlighted by a red box. The panel contains options for 'Select type of mark' (Automatic), 'Select Color' (Color palette), 'Select Size' (Size icon), 'Select Label' (Label icon), 'Select Detail' (Detail icon), and 'Edit Tooltip' (Tooltip icon). Arrows point from each of these labels to their corresponding controls in the Marks card.

Sheet 4

Sales

\$300,000  
\$250,000  
\$200,000  
\$150,000  
\$100,000  
\$50,000  
\$0

Object	Description
Select type of mark	Automatic
Select Color	Color palette
Select Size	Size icon
Select Label	Label icon
Select Detail	Detail icon
Edit Tooltip	Tooltip icon

# Show Me



Display/collapse Show Me

Select type of chart

For horizontal bars try

0 or more Dimensions

1 or more Measures



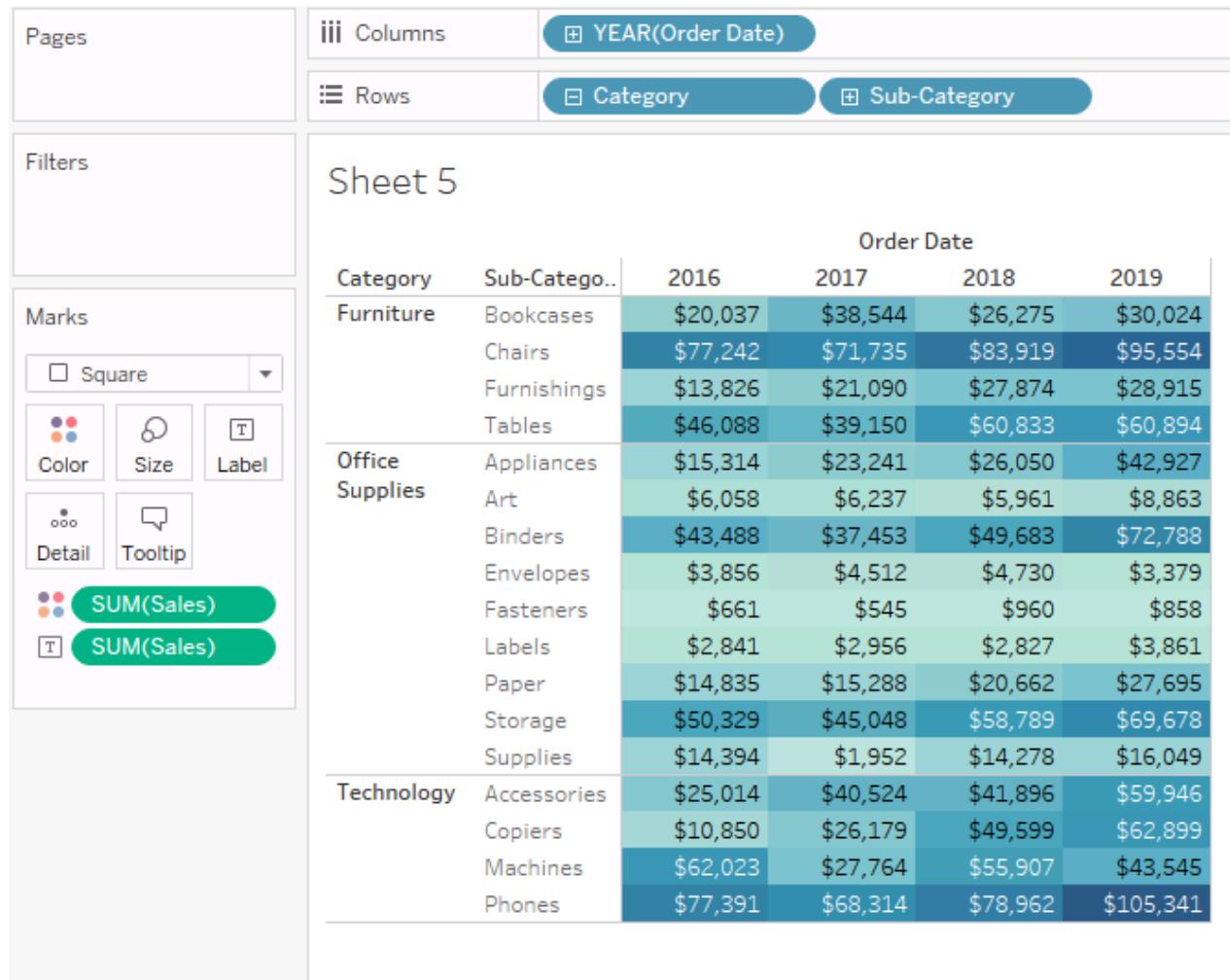
## Creating a View



# Topic B

## Customize Data in Visualizations

# Highlight Tables



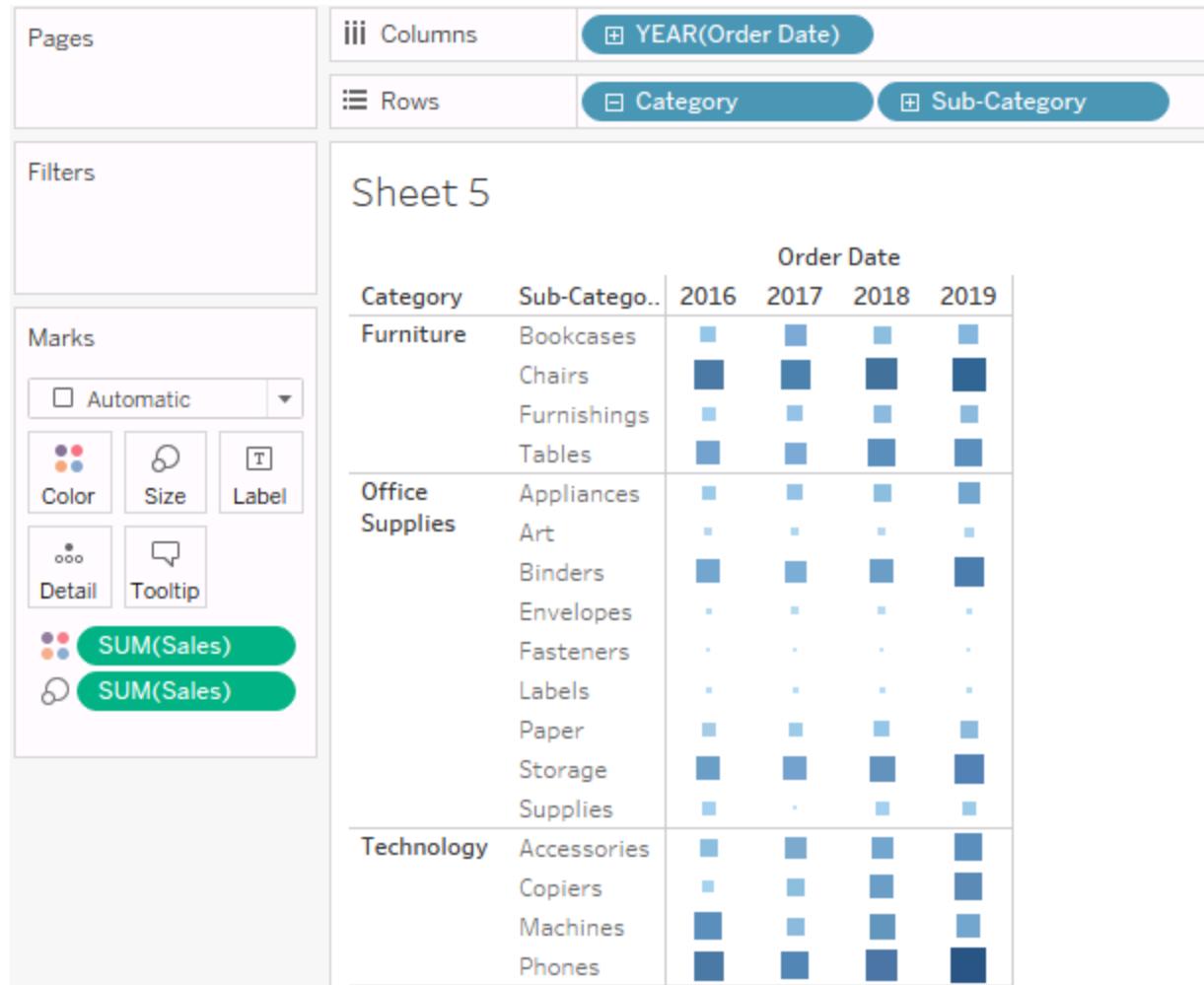
In this highlight table, the lower sales numbers are colored light blue and the blue gets darker the higher the sales number.

# Highlight Actions



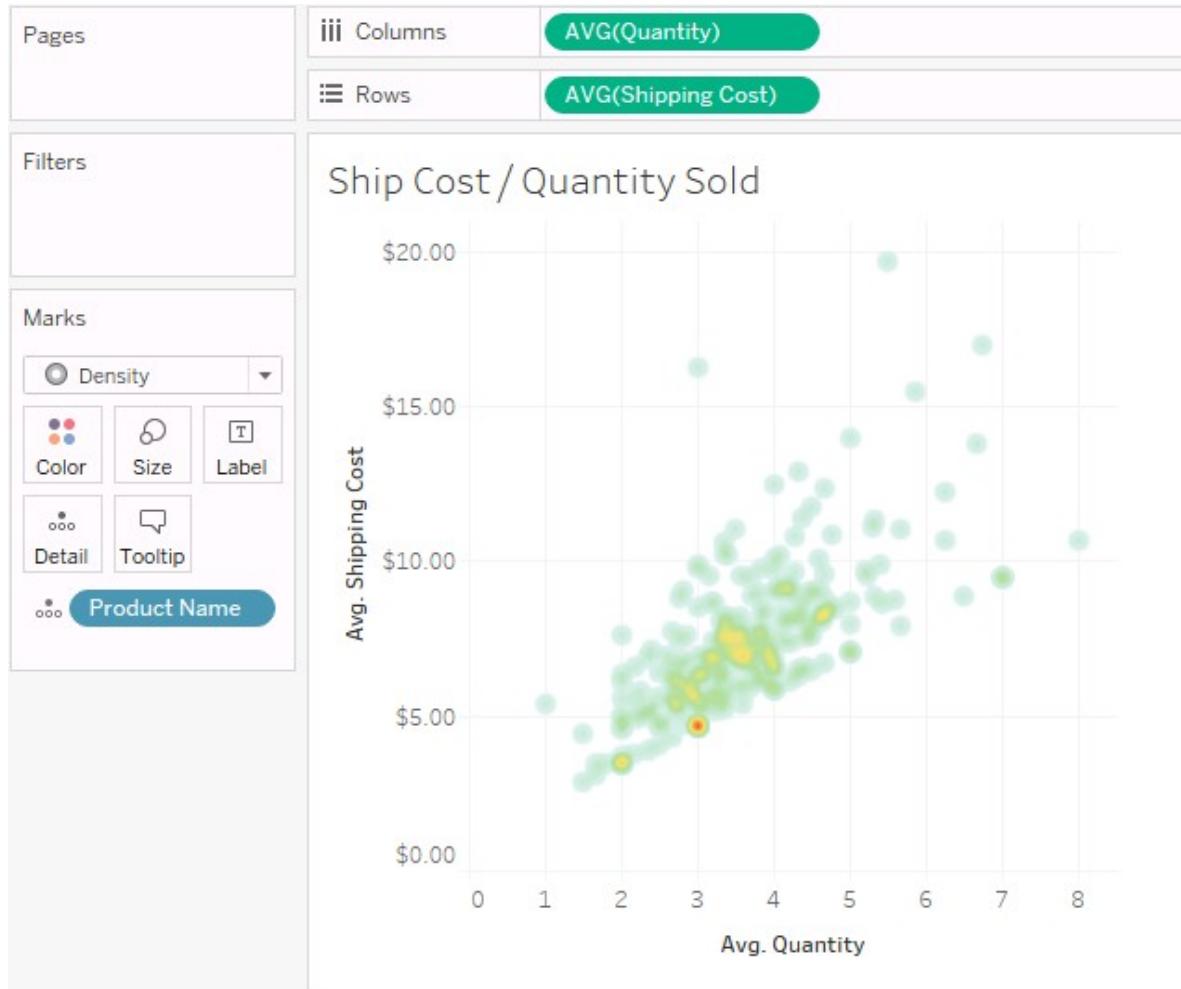
Highlight Action	Description	When to Use
Marks in a view	Manually select marks to highlight and save as part of the worksheet.	To showcase specific data for a report or call attention to specific insights.
Legends	Allows you to show entries on a legend on the <b>Marks</b> card for data in the viz.	Allows users to explore data by highlighting different data via the legend.
Highlighter	Allows you to search for keywords from a drop-down list.	To highlight one or more marks for discrete fields in the view.
Actions	Allows you to define criteria such as field name and apply highlights to those elements.	Commonly used when creating dashboards to allow for interactive exploration of the data, or to highlight specific fields from a list.

# Heat Maps



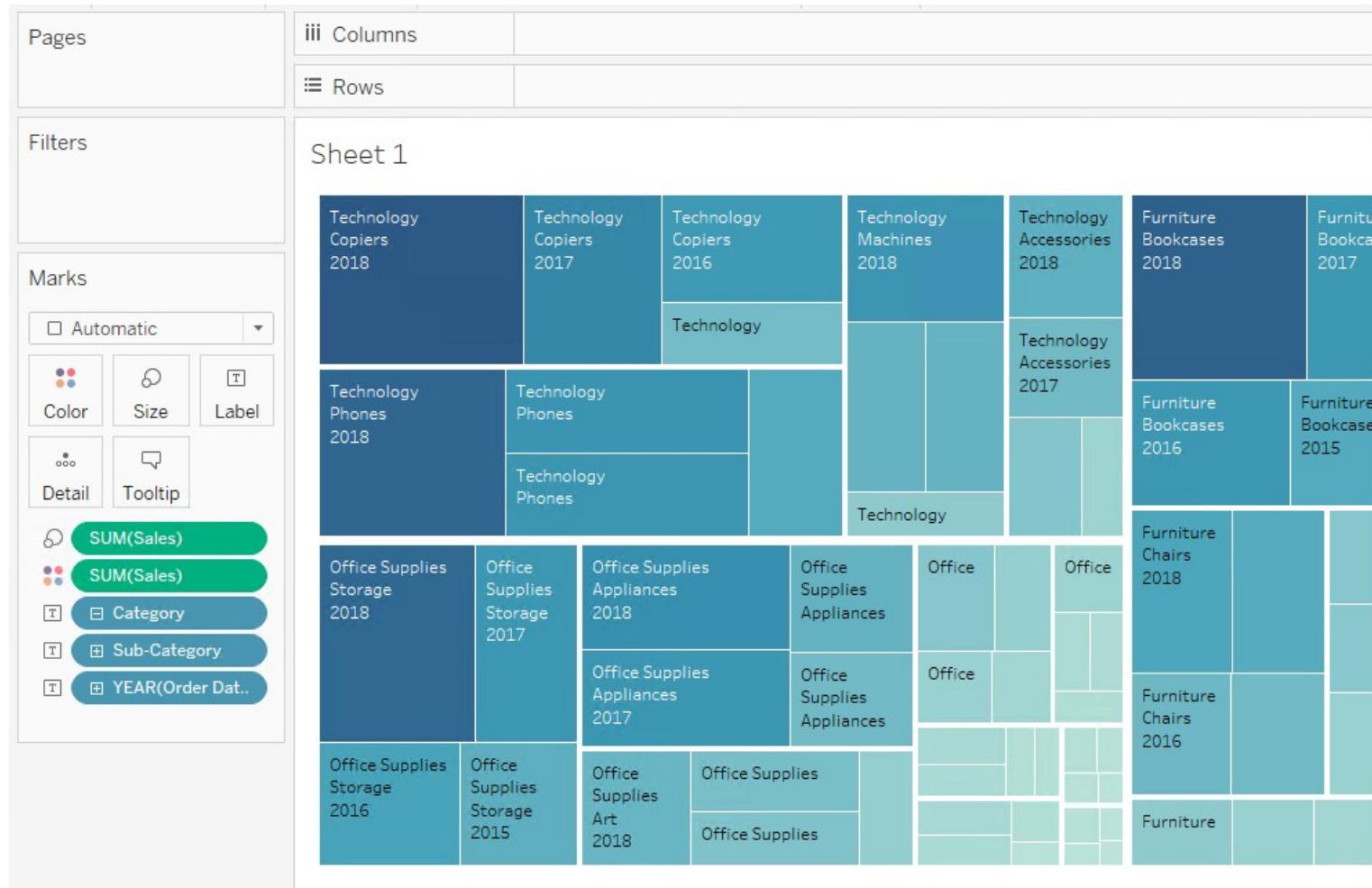
In this heat map, darker blue and larger squares show better sales performance, and lighter blue and smaller squares show poor sales performance.

# Density Mark



With density marks, warmer colors like yellow and red show where there is overlapping marks, and cooler colors like green and blue show no or little overlap.

# Tree Maps



*In this tree map, the best-selling products are the largest, darkest boxes for each category of product sold each year.*

# Measure Aggregation (Slide 1 of 2)



Aggregation	Description	For a measure with the numbers 1, 2, 2, 3...
Attribute	Shows the value of an expression only if it has a single value for all rows in the group.	NA
Dimension	Shows all unique values in a dimension or measure.	1, 2, 3
SUM	Sums all numbers.	8
Average	Arithmetic mean of all numbers.	2
Median	Median of all numbers.	2
Count	Number of rows.	4
Count (distinct)	Number of unique values.	3
Minimum	Shows smallest number.	1

# Measure Aggregation (Slide 2 of 2)



Aggregation	Description	For a measure with the numbers 1, 2, 2, 3...
Maximum	Shows largest number.	3
Percentile	Specify range and get percentile.	Pct50 yields 2
Std. Dev	Standard deviation.	.8165
Std. Dev (Pop)	Std. Dev based on population.	.7071
Variance	Variance based on sample population.	.6667
Variance (Pop)	Variance based on biased population.	.5000
Disaggregate	Shows all records.	1,2,2,3



## Analyzing Data Visually

# Hierarchies



Expand hierarchy on the shelf to drill into detail to the view

The screenshot shows the Tableau interface with the following components:

- Data** shelf: Sample - Superstore.
- Location hierarchy** (highlighted with a box):
  - Location
    - Country/Region
    - State
    - City
    - Postal Code
  - Product
    - Category
    - Sub-Category
    - Manufacturer
    - Product Name
    - Profit (bin)
    - Region
    - Top Customers by Profit
    - Measure Names
    - Discount
- Product hierarchy** (highlighted with a box):
  - Category
- Pages**: Sheet 6.
- Filters**: None.
- Marks**: Automatic, Color, Size, Label, Detail, Tooltip.
- Columns**: Category (highlighted with a blue box).
- Rows**: SUM(Sales) (highlighted with a green box).
- Sheet 6**: A bar chart titled "Category" showing Sales vs. Category. The Y-axis ranges from \$0 to \$800,000. The X-axis categories are Furniture, Office Supplies, and Technology. The sales values are approximately \$750,000 for Furniture, \$700,000 for Office Supplies, and \$850,000 for Technology.



## Discovering Insights with Hierarchies

# Table Calculations



- Table calculations are a special type of calculated field in Tableau.
- They are calculated on the data currently displayed in the visualization and don't use any dimensions or measures that have been filtered out of the visualization.
- As you change the calculation, the visualization updates.
- Table calculations must be manually constructed. You have to think through:
  - How to construct the calculations.
  - Which data sources to use.
  - How to compute the calculation.

# Quick Table Calculations



**Quick Table Calculations:** Frequently used table calculations that you can instantly apply to your visualization with the most common configuration for the calculation.

- **Running total.** A running total updates as new entries added to fields being totaled.
- **Difference.** Difference between values for comparison purposes.
- **Percent difference.** Difference between values as a percentage.
- **Percent of total.** Shows individual entries as a percentage of the total.
- **Rank.** Ranks values in the visualization.
- **Percentile.** Shows values as a percentage.
- **Moving average.** Filters fluctuations to show the average over a range of time.
- **YTD total.** Shows totals from the start of the year to the current date.
- **Compound growth rate.** Shows growth over multiple time periods.
- **Year over year growth.** Shows growth relative to the last yearly time period.
- **YTD growth.** The change, positive or negative, from the similar period previous year.

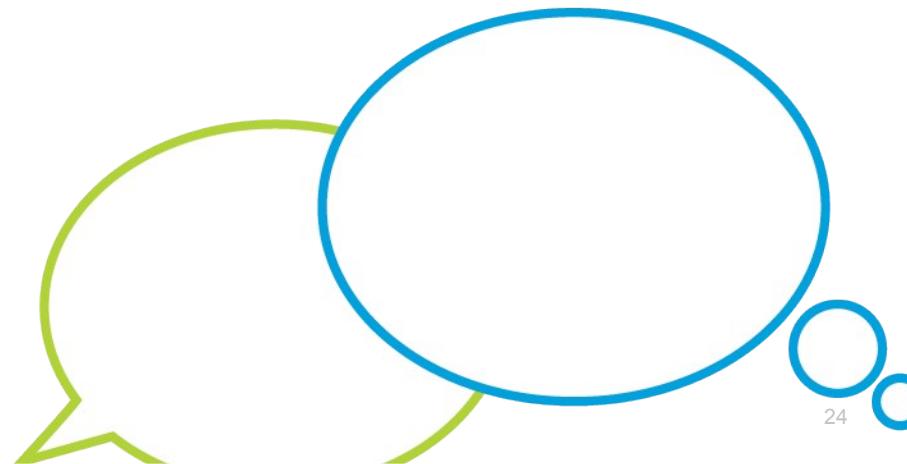


## Performing Quick Table Calculations

# Reflective Questions



1. When might you use hierarchies in data you work with?
2. Which of the techniques in this topic might help you solve a problem and how?



# Managing, Sorting, and Grouping Data



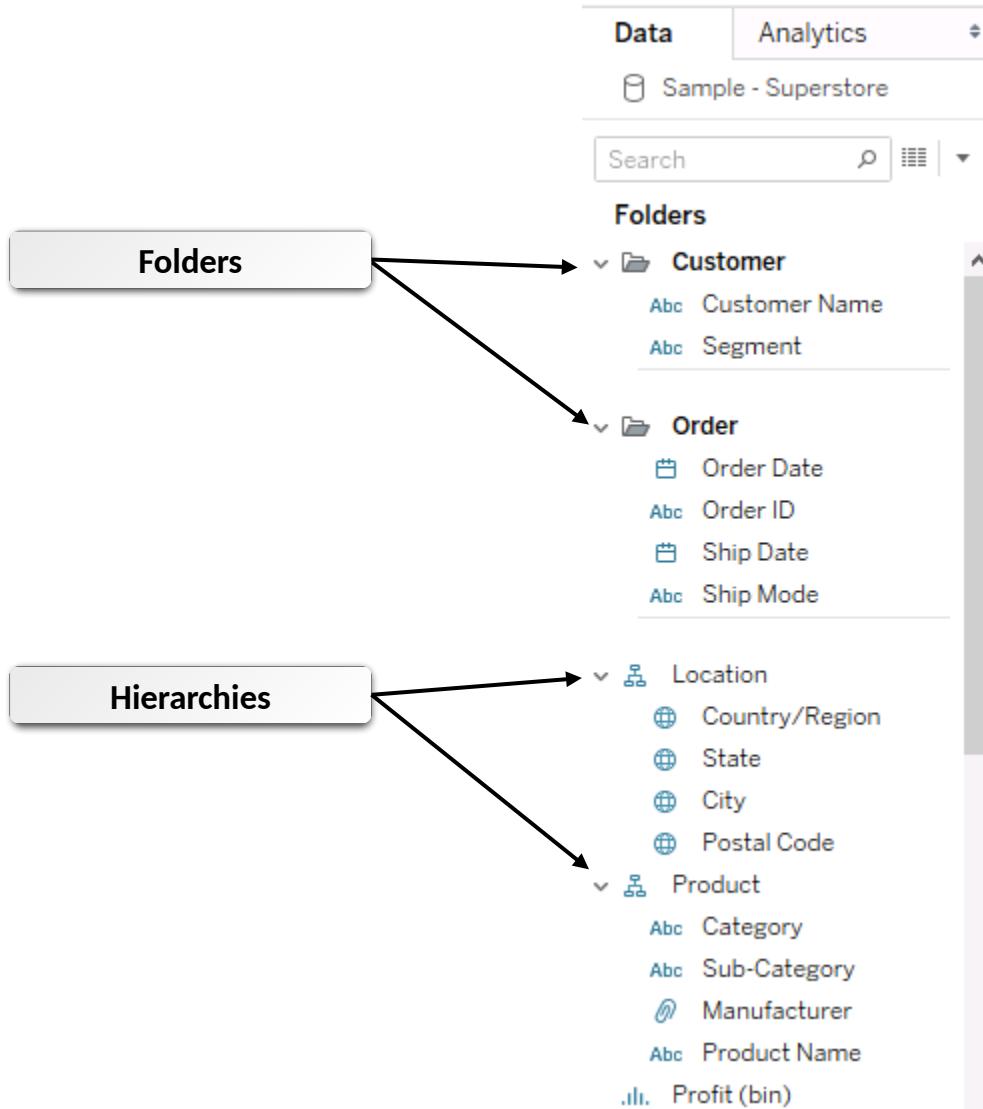
- Adjust Fields
- Sort Data
- Group Data



# Topic A

## Adjust Fields

# Organize Data Pane Items



# Data Pane Sort and Search Options



- **By Name:** Lists all dimensions and measures in alphabetical order by their field aliases.
  - Makes it easier to find specific fields when working with smaller numbers of dimensions and measures.
- **By Data Source Order:** Lists the dimensions and measures in the order provided by the underlying data source.
  - Helpful for larger data sets that may have many tables, and where you understand the organization of the underlying data source.

# Options for Renaming Fields



The screenshot shows the Tableau Data pane with the 'Data' tab selected. A search bar at the top contains 'Sample - Superstore'. Below it, the 'Folders' section lists 'Customer', 'Order', 'Location', and 'Product'. The 'Customer' folder is expanded, showing fields like 'Customer Name', 'Segment', and 'Country'. A context menu is open over the 'Customer Name' field, listing options: 'Add to Sheet', 'Duplicate', 'Rename', 'Hide', 'Aliases...', 'Create', 'Transform', 'Convert to Measure', 'Change Data Type', 'Geographic Role', 'Default Properties', 'Group by', 'Folders', 'Hierarchy', 'Replace References...', and 'Describe...'. A callout bubble on the right side of the menu contains the text 'Options for managing and organizing fields'.

Customer Name

- Add to Sheet
- Duplicate
- Rename
- Hide
- Aliases...
- Create
- Transform
- Convert to Measure
- Change Data Type
- Geographic Role
- Default Properties
- Group by
- Folders
- Hierarchy
- Replace References...
- Describe...

Options for managing and organizing fields

# Options for Hiding and Unhiding Fields



- Hiding fields to create data extracts that have only the fields needed for the views, saving space and increasing performance.
- Hiding fields that have null values.
- Hiding columns in table calculations comparing previous to next.
  - In that case, at least one column will have null values because there won't be data to compare it to. You can hide that column.



## Adjusting Fields



# Topic B

## Sort Data

# Options for Sorting Data in Visualizations



Sort Using	Description
Quick sort from axis, header, or field label	Sort buttons may be available in the visualization beside headers, field labels, and the axis.
Sort button on the toolbar	Selecting the sort ascending and sort descending buttons on the toolbar will sort the data in the visualization accordingly.
Sort specific fields	In Tableau Desktop only, you can right-click a dimension field you wish to sort and select <b>Sort</b> . You must select a sort order (ascending or descending) and a sort by option.
Manual sort by header and legend	You can manually sort data using headers by dragging and dropping header names to create a sort order.

# Visualization Sort by Options



- **Alphabetically:** Sorts the data by first letter.
  - Case sensitive. Capitals such as A-Z sort before lower case such as a-z.
- **Data source order:** Sorts the data in the sort order used by the data source.
- **Field:** Sorts data based on the values in a field.
- **Manual:** Selects available fields from a list and moves them up/down in the sort order.
- **Nested:** Allows you to sort data within a pane of an existing sort such as the subcategory region in a sorted sales list.

# Interpretation of Sort Results



- The sort will update as the underlying data is updated.
- The entire table of data is sorted using the criteria specified
  - You must plan to sort all the data in the table or potentially filter data.
- The dimension hierarchy is not adjusted by sorts.
  - Fields are sorted in the context of the fields defined by the Rows and Columns shelves.
  - Tableau will not rearrange any of the headers for fields to the left of the sorted field.

# Options for Combining Fields



- You can combine fields to create a cross product based on members of different dimensions.
- For example, if a shoe store sells shoes, accessories, and clothes, a data analyst may wish to combine category and subcategory to display all shoe products, all accessories, and so forth.
- When two fields are combined, a new name for the combined field is made from the two names of the previous field.



When using nested sorts, keep the following in mind:

- Nested sorts are correct for the sorts applied when viewed in the context of each independent pane.
  - However, they don't provide aggregated information about the results in comparison to each other.
- Nested sorts are inherited when you drill down in a dimension.
- A nested sort is the default when sorting from an axis.
- If a dimension is on the same shelf as a measure, an axis will be displayed for each value of the dimension in the view and sorting on the axis will create a nested sort specifically for that view.

# Options for Showing, Hiding, and Clearing Sorts



- Tableau gives you visual cues to tell you how data in the visualization is sorted.
- Access sort icons and fields in shelves that have sorts applied to display a graphic that shows what type of sort is applied (such as ascending vs. descending).
- Clear sorts by right-clicking the sorted data and selecting **Clear sort**.



## Sorting Data



# Topic C

## Group Data

# Group Data



**Group:** A way to combine related discrete data entries within dimensions into higher-level categories.

Edit Group [Grouped Products] X

Field Name:

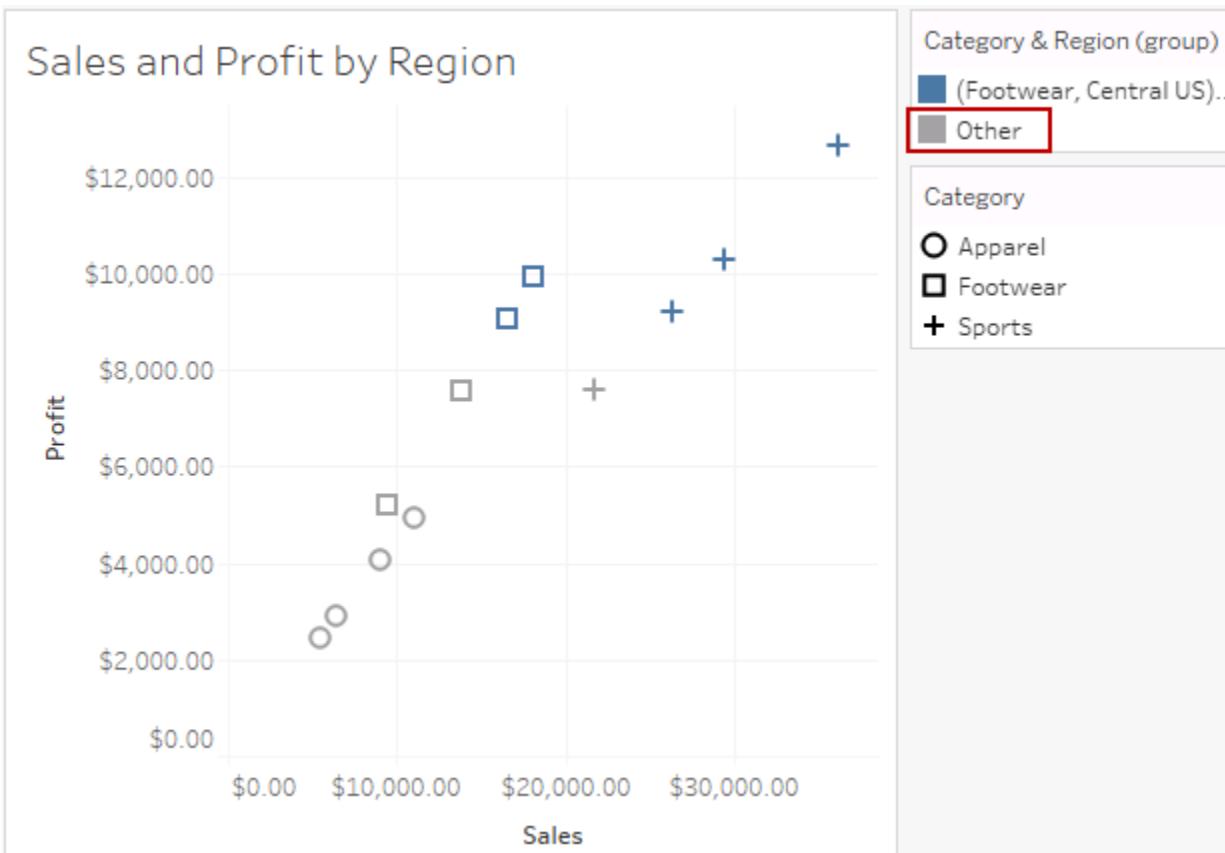
Groups:

- Basketball Shorts
  - Basketball Shorts Black
  - Basketball Shorts Blue
  - Basketball Shorts Green
  - Basketball Shorts Orange
  - Basketball Shorts Red
  - Basketball Shorts White
  - Basketball Shorts Yellow
- Football Helmet Black
- Football Helmet Blue
- Football Helmet Green

Show Add Location

Include 'Other'

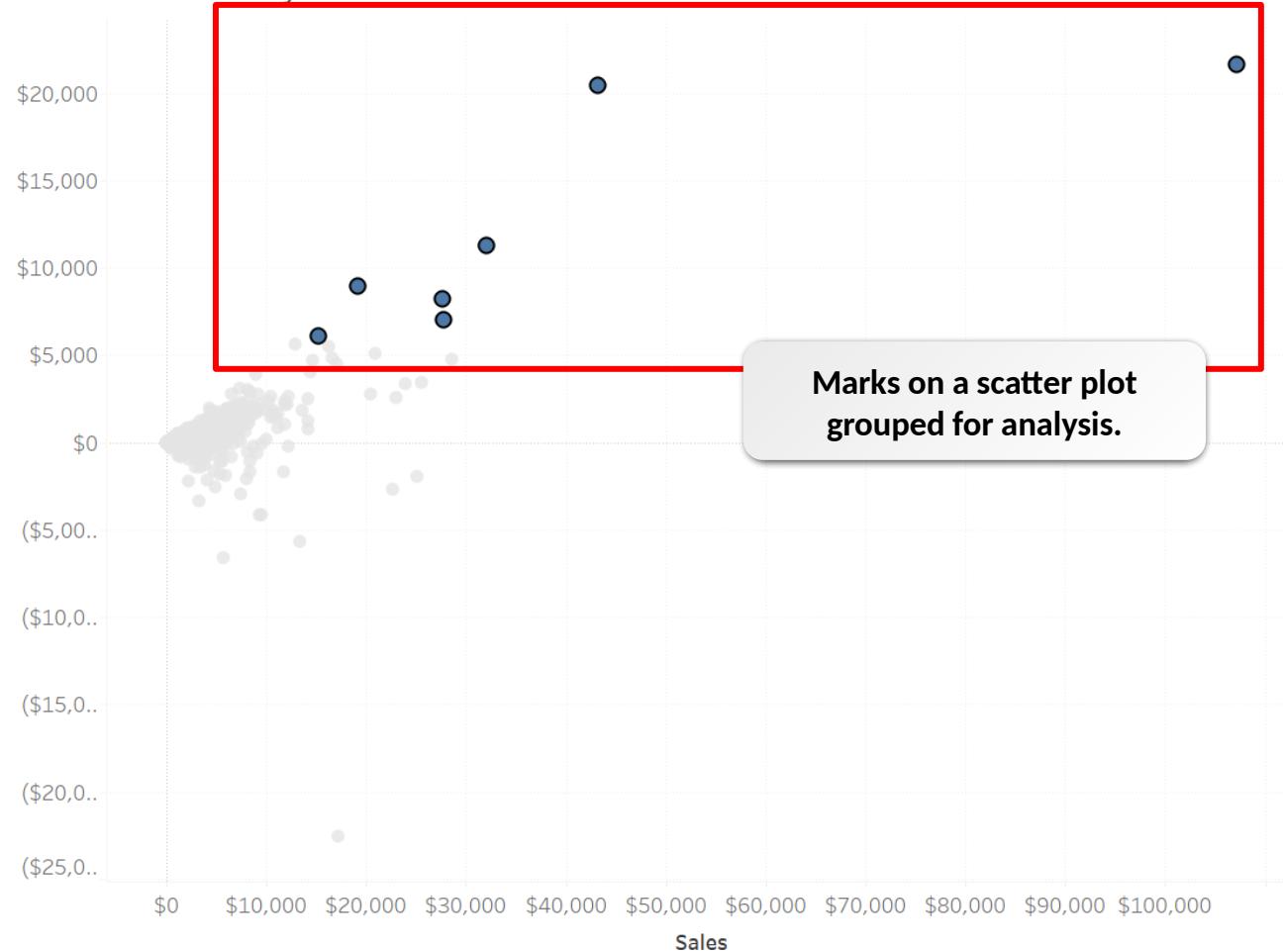
# Other Group



# Visual Grouping with Marks



Sales and Profit by Customer



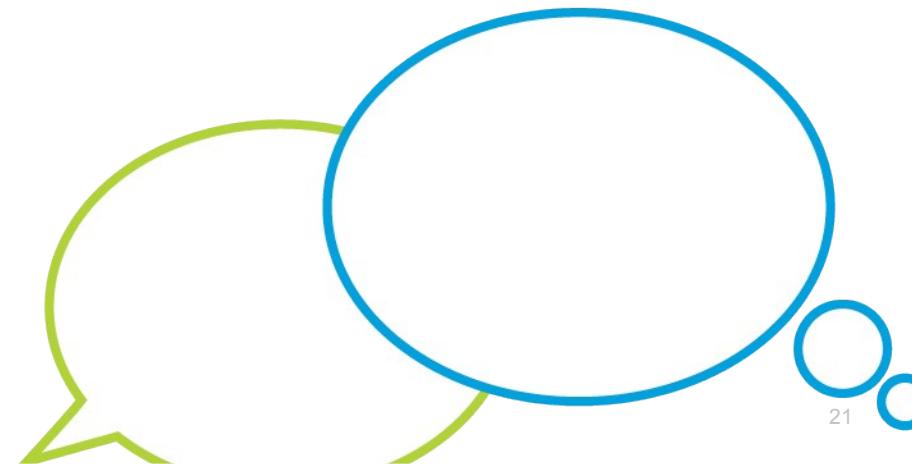


## Grouping Data

# Reflective Questions



1. How will you organize the data you work with and why?
2. Which ways would you use grouping or sorting in data you work with?



# Saving, Publishing, and Sharing Data



- Save Data Sources
- Publish Data Sources and Visualizations
- Share Workbooks for Collaboration



# Topic A

## Save Data Sources

# Data Sharing Options



You can share the following in Tableau:

- Data sources
  - Save and share files
  - Publish with Tableau Server or Tableau Online
- Workbooks
  - Share files or publish
  - Users can interact with Tableau Reader or Tableau Desktop

# Options for Saving Data Sources

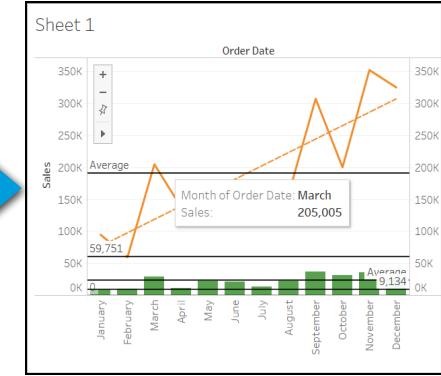
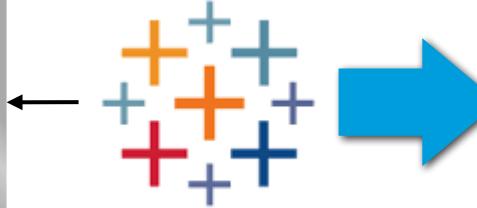
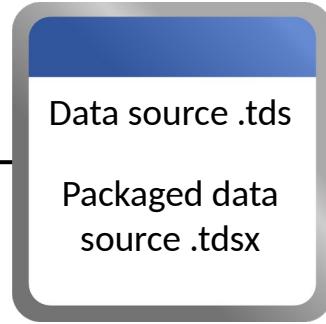
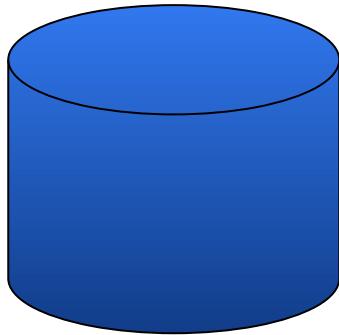


Data source

Saved data  
sources

Tableau Desktop

Create new visualizations  
from the data source





**Data Extract:** Subsets of data saved from an underlying data source such as a file or database. Tableau connects to the extract as a data source.

Extracts are commonly used for the following reasons:

- They support large data sets that contain billions of rows of data.
- They improve performance.
- To take advantage of Tableau functionality that isn't available for the original data source.
- To provide offline access to data.

# Data Extract Storage Options



Extract Data X

Specify how to store data in the extract:

**Data Storage**

Logical Tables       Physical Tables

Store data using one table for each logical table. [Learn more](#)  
Use this option if you need to use extract filters, aggregation, or other extract settings.

Specify how much data to extract:

**Filters (optional)**

Filter	Details

**Add...**    **Edit...**    **Remove**

**Aggregation**

Aggregate data for visible dimensions  
 Roll up dates to Year

**Number of Rows**

All rows  
 Incremental refresh

Top: Orders by rows

Sample: Orders by rows

**History...**    **Hide All Unused Fields**    **OK**    **Cancel**

# Options for Refreshing Data Extracts



## Full Refresh

- Default option.
- Replaces contents of the extract with data from the original source.
- Pros:
  - Get a full copy of data from the source.
- Cons:
  - May take time to create.
  - May impact data source performance.
- Best for extracts from data sources where changes in data in existing records happen frequently.

## Incremental Refresh

- Only adds new rows since last refresh.
- Existing rows are not modified (even if they have been at the data source).
- Pros:
  - Faster to create than a full refresh.
  - Less impact on data source.
- Cons:
  - Updates to existing records aren't reflected in updates.
- A good choice for data sources where existing records are rarely modified (or modifications aren't important).

# Guidelines for Saving Data Sources



- After you create an extract, the workbook's data source is updated to the extract but you must save the workbook to save the connection to the extract.
- If working with a large data set, create an extract with a smaller sample of the data. That way you can create your view to avoid processing lags when fields are placed on shelves.
- Switch between the sample extract and the original data source on the **Data Sources** tab to verify the view you're constructing is working as expected with the full data.



## Saving Data Sources



# Topic B

## Publish Data Sources and Visualizations

# Collaboration in Tableau



Product	Description
Tableau Server	An on-premises enterprise-level solution allowing users to share information throughout their organization and with partners.
Tableau Online	A cloud-hosted version of Tableau Server that runs on Tableau-managed infrastructure that provides similar publication, sharing, and security features found in Tableau Server.

# Comparison of Features of Tableau Online and Tableau Server

## (Slide 1 of 2)



Features	Tableau Online	Tableau Server
Publish data sources, flows, worksheets, visualizations, and dashboards.	Yes	Yes
Invite colleagues and customers to explore interactive visualizations.	Yes	Yes
Allow site admins to manage permissions for users, content, and data.	Yes	Yes
Supports access from Tableau Desktop.	Yes	Yes
Supports browser-based interaction, editing, and authoring.	Yes	Yes
Supports access from Tableau Mobile.	Yes	Yes
Requires on-site staff to support and manage.	No	Yes

# Comparison of Features of Tableau Online and Tableau Server

## (Slide 2 of 2)



Features	Tableau Online	Tableau Server
Requires on-site hardware.	No	Yes
Software upgraded automatically.	Yes	No
Connect to data sources from anywhere (via Tableau Bridge).	Yes	Yes
Embed interactive dashboards on websites and in apps.	Yes	Yes
Meets SOC 2 security requirements.	Yes	Depends on local implementation
Supports integration with Tableau Data Management, Tableau Prep Conductor, and Tableau Catalog.	Yes	Yes

# Benefits of Publishing Data Sources



- It becomes accessible to other data analysts in your organization.
- Different teams and individuals can be sure they are working from the same data source, not copies of the data source file that may have changed or gotten out of sync.
- You can provide a meaningful name and description.
- Data preparation has already been performed, so that work won't need to be duplicated.
- Data sources are secured by authentication and permissions in Tableau Server and Tableau Online.

# Data Source Publication Process



# Hidden Fields from Published Data Sources



- For new workbooks created from a published data source, any fields that are hidden in that data source will remain hidden in the new workbook.
- Hidden fields cannot be used in calculations, sets, groups, and other object creation.
- If an existing workbook uses a published data source with hidden fields, both views and calculations that use the fields are invalid.
- To address these issues:
  - Unhide fields and update the data source
  - Or update views and calculations in workbooks so that hidden fields aren't referenced



- It may not be possible to refresh data in Tableau Online from data sources with data that is maintained on-premises, behind the corporate firewall.
- Tableau Bridge is essentially the Tableau Online sync client plus live query functionality that replaced the sync client with Tableau version 10.3.
- It's designed to maintain connections to on-premises data and publish extract data sources that Tableau Online cannot directly reach.
- Tableau Bridge can create scheduled refreshes in a similar way as the client sync refreshes extracts.

# Guidelines for Preparing Data Sources for Publication



- Perform any customization and cleanup that's necessary so that others can use the data source efficiently.
- Decide on a meaningful naming standard so that users can identify the data sources they are looking for.
- You can't rename a data source once it's published; instead, you must republish it.



## Publishing Data Sources and Visualizations



# Topic C

## Share Workbooks for Collaboration

# Options for Sharing with Tableau Users



- You can share a workbook by sharing any of the Tableau files previously discussed, including:
  - Workbook files (.twb)
  - Bookmark files (.tbtm)
  - Packaged workbooks (.twbx)
- Publish to Tableau Server or Tableau Online
  - Accept default or set custom access permissions.
  - Allows collaboration such as comments and @mentions.
  - Level of interaction allowed depends on user's license.

# Options for Sharing with Non-Tableau Users



- Share with non-Tableau users by exporting and sharing files in the following formats:
  - Image files in .png, .bmp, .emf, or .jpg format
  - Database file format (.mdb)
  - Crosstab Excel file (.xls)
  - PDF
- Publish visualizations to Tableau Public
  - Publish for free.
  - Visuals are not secure and are accessible by anyone on the Internet.
  - Can be viewed with the free version of Tableau Desktop.



Security for workbooks and their data can be applied in the following ways:

- **Database login method.** When publishing a workbook with a live data source, you can opt to use Windows Authentication or authentication provided by the database software.
- **Authentication mode.** When publishing a workbook with a live data source, you can choose how users are authenticated.
- **User filters.** You can set filters in a workbook or data source that control what data can be seen by individuals.

# Predefined Sharing Roles



Role	Description
Viewer	Allows users to view the workbook on Server or Online, as well as add comments and save custom views.
Explorer	Allows users to view the workbook, edit workbook views, apply filters, view underlying data, export images, and export data.
Creator	Provides all capabilities to users with this role.

# User Groups in Tableau Online and Tableau Server



- In Tableau Online and Tableau Server, you must add users to allow access to resources, including shared data sources and workbooks.
- Once you create a group, you can add users to it.
- You can then grant access to workbooks, data sources, and other objects to groups so that any member of the group can access the resources.



## Saving and Sharing Data

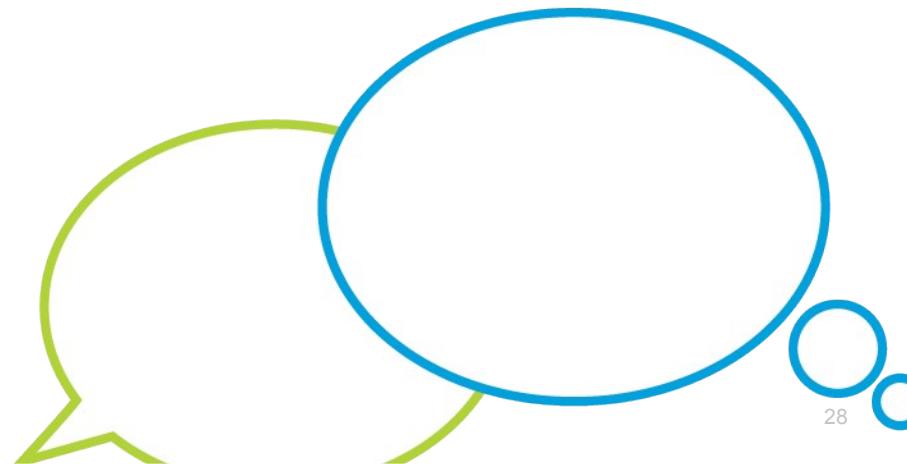


## Sharing Workbooks with Limited Access

# Reflective Questions



1. When might you publish or share Tableau data sources or workbooks in your organization?
2. Why might you consider using Tableau Server or Tableau Online?



# Filtering Data



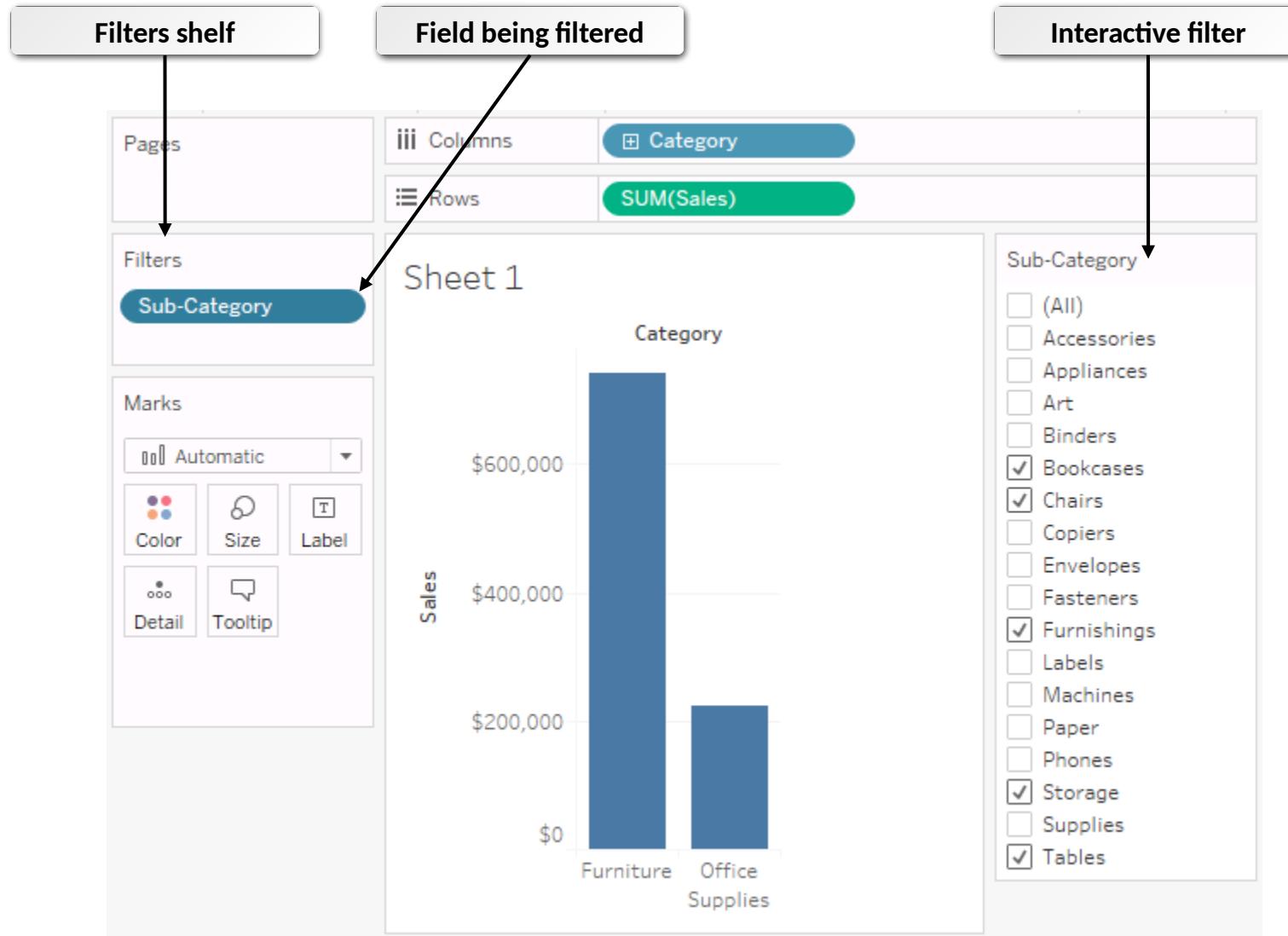
- Configure Worksheet Filters
- Apply Advanced Filter Options
- Create Interactive Filters



# Topic A

## Configure Worksheet Filters

# Data Filtering in Tableau



# When Data Can Be Filtered



- In worksheets to set constraints about what is displayed in the views. Worksheets can be filtered at:
  - Record level
  - Row level
  - Column level
  - The aggregated view
- At the data source prior to bringing data into Tableau.

# Options for Adding Filters



You can apply filters in many different ways in Tableau:

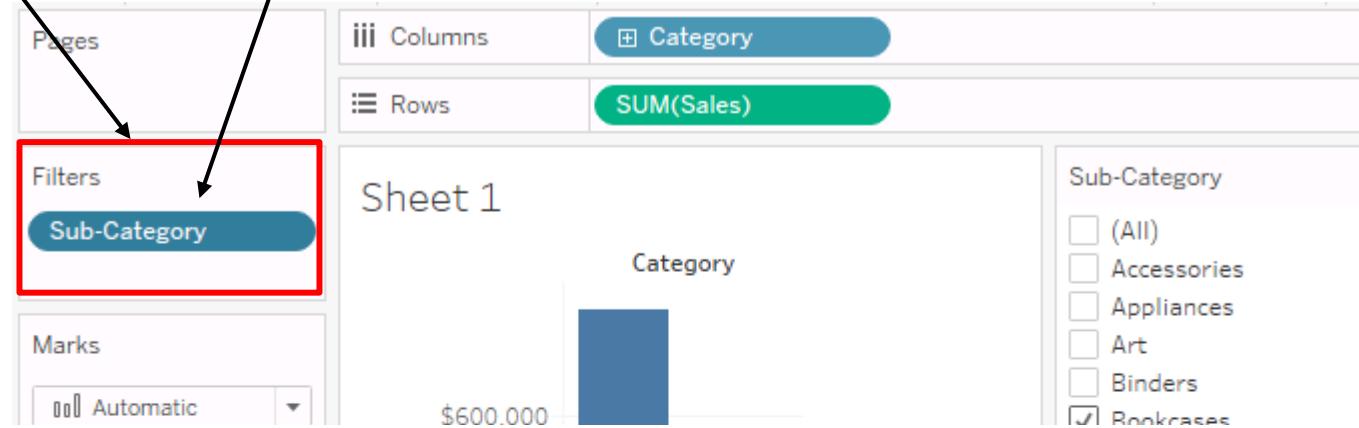
- Drag fields to the **Filters** shelf.
- Select one or more marks in the viz and click the selection to open the tooltip.
- Select to keep or exclude from headers the same way you do with selected marks.
- Double-click a header to keep only that header.
- In some cases, you have the option to configure keep only and exclude options from legends.

# Filters Shelf



**Filters shelf**

**Field filtering data in the view**



# Filter Categorical Data (Dimensions)



Filter [Sub-Category]

General Wildcard Condition Top

Select from list  Custom value list  Use all

Enter search text

- Accessories
- Appliances
- Art
- Binders
- Bookcases
- Chairs
- Copiers
- Envelopes
- Fasteners
- Furnishings
- Labels

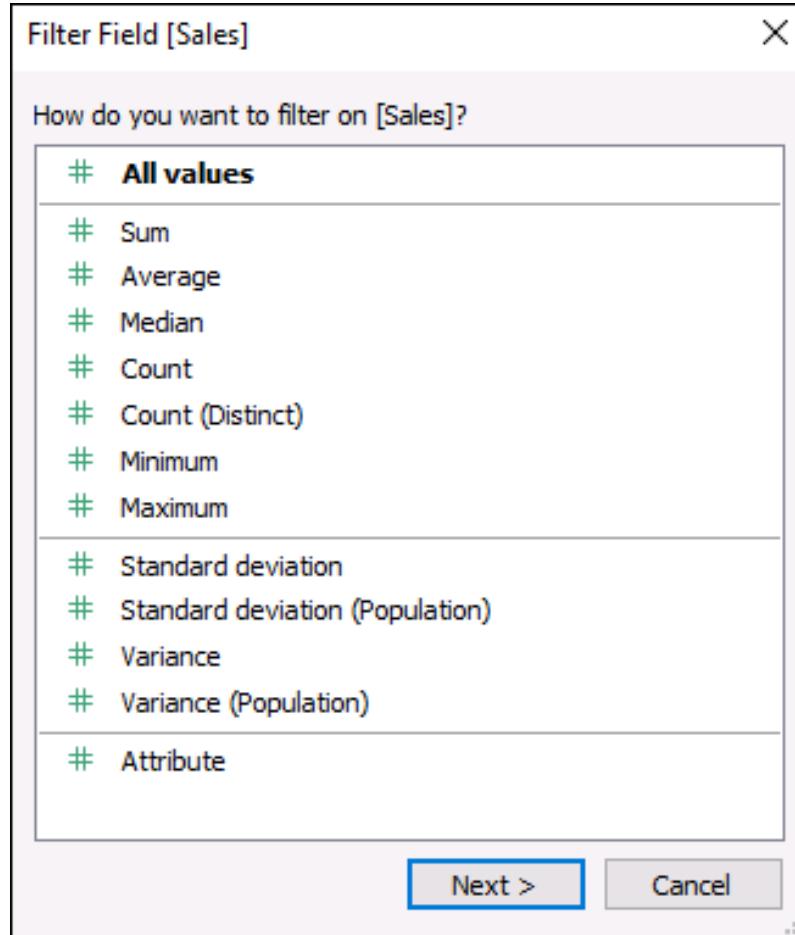
All None  Exclude

Summary

Field: [Sub-Category]  
Selection: Selected 5 of 17 values  
Wildcard: All  
Condition: None  
Limit: None

Reset OK Cancel Apply

# Filter Continuous Data (Measures)



# Filter Dates



Item	Allow you to:
Relative Dates	Filter based on years, quarters, months, or days and select a range of dates anchored from the current date or a specific date.
Range of Dates	Select a range of dates from a calendar.
Starting Date	Select a starting date from a calendar.
Ending Date	Select an ending date from a calendar.
Special	Select null dates and non-null dates.

# Table Calculation Filters



- Create a table calculation filter by placing a calculated field on the **Filters** shelf.
- Use to adjust totals that are calculated in the view and decide when the filter should be applied to a calculated field.
- To apply a table calculation filter, select **Apply to total** from the drop-down menu for the calculated field on the **Filters** shelf.



## Configuring Filters in Tableau



# Topic B

## Apply Advanced Filter Options

# Data Source Filters



Right-click the data source and select Edit Data Source Filters

The screenshot shows the Tableau interface with the 'Edit Data Source Filters' dialog open. A callout bubble points to the 'Edit Data Source Filters' button in the top right corner of the main workspace. A large blue arrow points from the callout to the 'Edit Data Source Filters' dialog. Another blue arrow points from the dialog to the 'Filter [Sub-Category]' configuration window, which is displayed as a modal.

**Edit Data Source Filters**

**Filter [Sub-Category]**

General Wildcard Condition Top

Select from list  Custom value list  Use all

Enter search text

- Accessories
- Appliances
- Art
- Binders
- Bookcases
- Chairs
- Copiers
- Envelopes
- Fasteners
- Furnishings
- Labels

All None Exclude

Summary

Field: [Sub-Category]  
Selection: Selected 0 of 17 values  
Wildcard: All  
Condition: None  
Limit: None

Reset OK Cancel



- You can create extract filters for data extracts at the time you create the extract.
- You can add filters in a fashion similar to adding data source filters from the **Extract Data** dialog box.
- If you create an extract from a data source that has data source filters, those filters are recommended as extract filters.
- You are not required to use them, and they can safely be removed without affecting the existing set of data source filters.



- All filters you configure in Tableau are computed independently by accessing all rows in the data source.
- Context filters complete their filter operations first.
- You can improve performance by having your context filter reduce the number of records to be processed before other filtering operations execute.
- To create a context filter, right-click one or more filters on the **Filters** shelf and select **Add to context**.
- Typically, context filters should not be something that will change frequently.

# Filter Application Across Multiple Worksheets



Apply To	Options	Apply to Worksheets	Description
Current worksheet only	Current worksheet only.	Only this worksheet.	Applies the filter to the current worksheet only.
Multiple worksheets	Apply to all worksheets that use a related primary data source.	All worksheets using the current primary or related data sources.	Applies filters to worksheets based on the current data source and data sources with a relationship to it.
Multiple worksheets	Worksheets that use the current primary data source.	All worksheet using the current primary data source as their primary data source.	Applies filters to worksheets based on the current data source as their primary data source.
Specific worksheets	Apply to select worksheets.	Worksheets you select.	Choose worksheets from a dialog box to apply the filter to.
Specific worksheets	All worksheets in a dashboard.	All worksheets in the dashboard that use the primary or a related data source.	Applies the filter to all worksheets in the dashboard that use the same or a related primary data source.



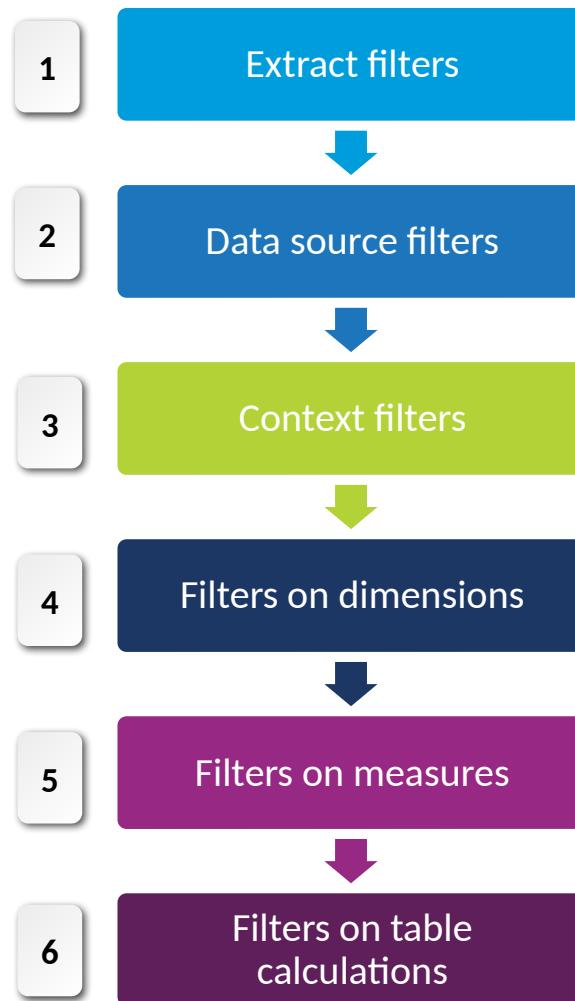
Decide how to launch the action:

- **By hover.** The action will launch if the mouse pointer rests over the mark. This type of launch works well for highlight and filter actions on dashboards.
- **By selection.** Click the mark to launch the action.
- **By menu.** Right-click the mark and select the option from the menu. This works well for filter and URL actions.

Specify what to do when the action is cleared:

- **Leave the filter.** Leaves the filter on the destination sheets.
- **Show all values.** Changes the filter to show all values.
- **Exclude all values.** Changes the filter to exclude all values. This option is useful for dashboards that only show some sheets if a value in another sheet is selected.

# Filter Order of Operations



# Guidelines for Configuring Worksheet Filters



- You can add filters through a variety of actions, but remember that view level filters will always appear on the **Filters** shelf where they can be configured and removed.
- Use descriptive names for filter actions that explain what the filter is doing.
- Using a single context filter to reduce the size of the data is a better choice than applying multiple context filters.
- Complete any of your data modeling before creating a context because changes in the data model require recomputing the context.
- Set filters for and create the context before adding fields to other shelves.
- If your data set is heavily indexed at the data source, context filters may not improve performance.



## Applying Advanced Filters



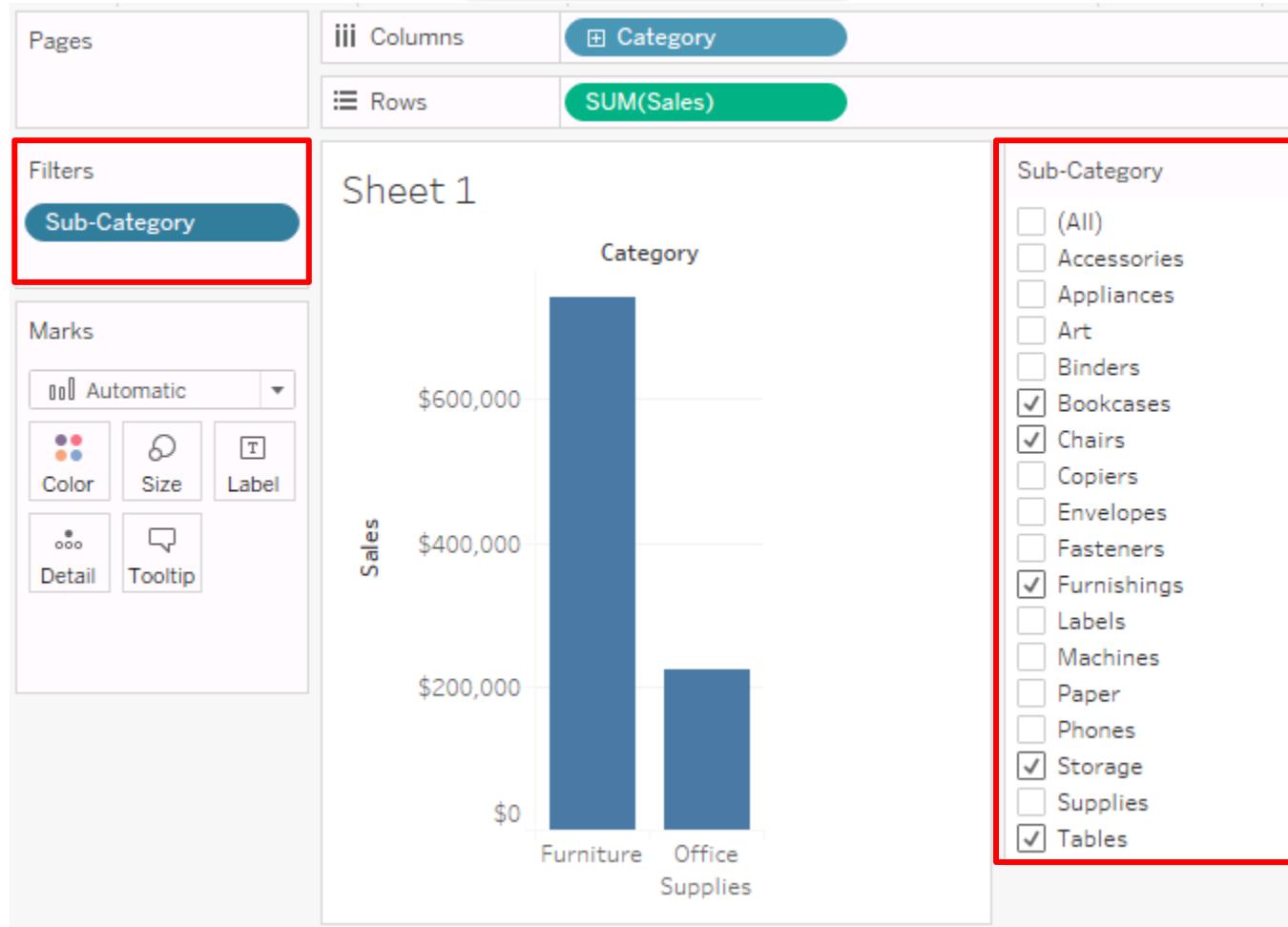
# Topic C

## Create Interactive Filters

# Interactive Filters



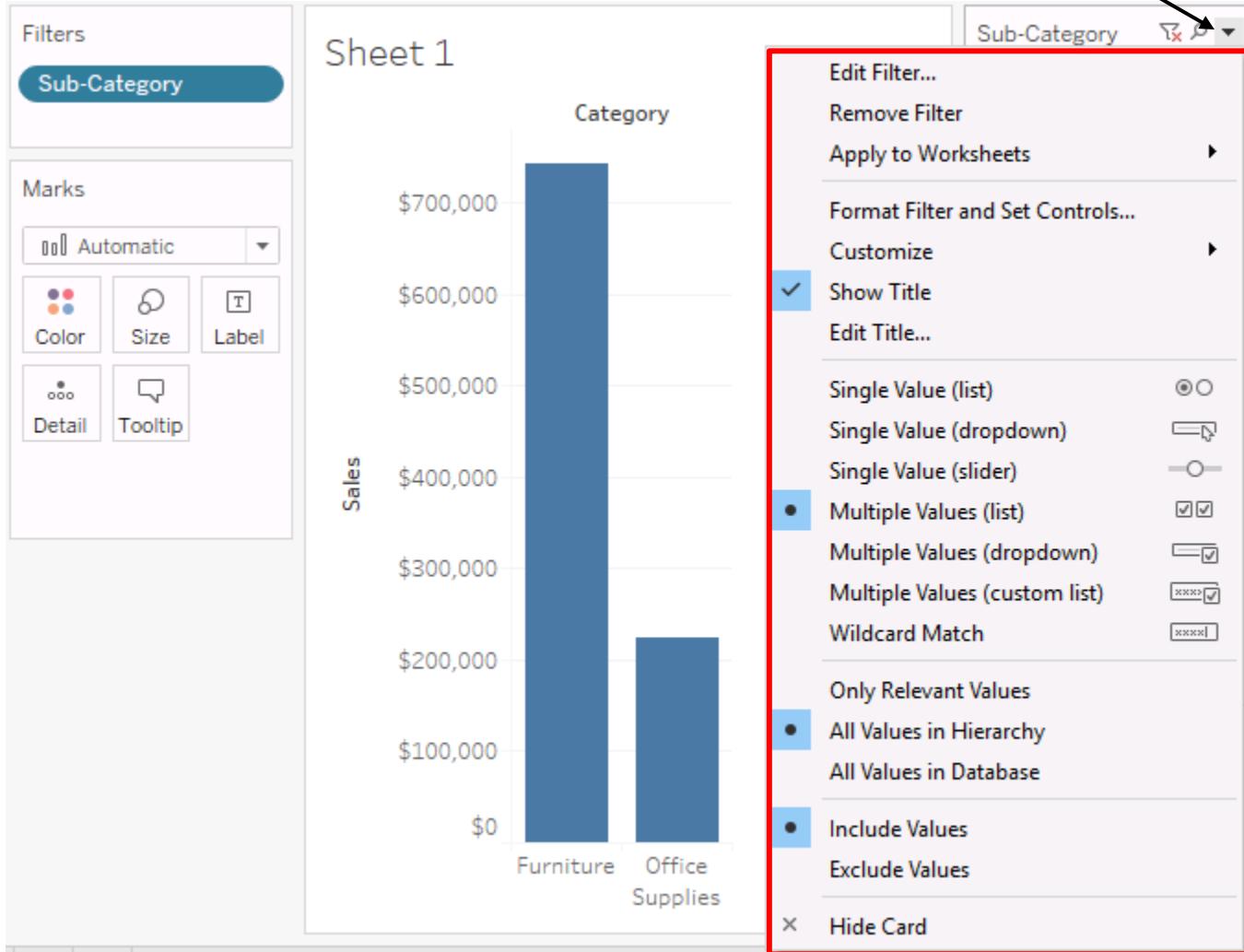
Interactive filter in the view and on the Filters shelf.



# Filters Card Configuration



Configuration drop-down



# Dimension Filters Card Modes



Mode	Description
Single Value (List)	Displays values as a list of radio buttons.
Single Value (Drop-down)	Displays values in a drop-down list.
Single Value (Slider)	Displays values along the range of a slider.
Multiple Values (List)	Displays values in a list of check boxes.
Multiple Values (Drop-down)	Displays values in a drop-down list.
Multiple Values (Custom List)	Displays a text box where you can search for string values.
Wildcard Match	Displays a text box where you can search by strings with an asterisk as a wildcard.

# Measure Filters Card Modes



Mode	Description
Range of Values/Dates	Shows values of the filters as a pair of sliders you can adjust to include or exclude values.
At Least/Starting Date	A slider allows you to configure a minimum value when filtering an open-ended range.
At Most/Ending Date	A slider allows you to configure a maximum value when filtering an open-ended range.
Relative to Now	Configure a dynamic date range that updates based on when the view is opened.
Browse Periods	Select common date ranges such as past day, week, month, three months, one year, and five years.

# Interactive Filter Customization (Slide 1 of 2)



Option	Description
Show "All" Value	This toggle determines if the <b>All</b> option is displayed for multiple and single value lists.
Show Search Button	This toggle determines if a search button is shown at the top of the filter.
Show Include/Exclude	This toggle determines if the <b>Include Values</b> and <b>Exclude Values</b> commands are shown on the <b>Filters</b> card menu.
Show Filter Types	This toggle determines if users have the option to change the type of quick filter shown.
Show More/Fewer Button	This toggle determines if the <b>More/Fewer</b> button is shown at the top of the filter to allow users to see more or fewer members.
Show All Values Button	This toggle determines if the <b>Show All Values</b> button is shown on the <b>Filters</b> card.

# Interactive Filter Customization (Slide 2 of 2)



Option	Description
Show Apply Button	This toggle determines if the <b>Apply</b> button is shown at the bottom of the filter.
Show Readouts	Allows you to show the minimum and maximum values text above a range of values.
Show Slider	Determines if the slider displays. If this option is cleared, the filter only displays the readouts.
Show Null Controls	Determines if a drop-down list is shown that lets you control how the filter deals with null values and provides options for displaying or not displaying them.

# Guidelines for Creating Interactive Filters



- Name the filters using action verbs to tell people how to use the filter.
- Consider the purpose of the view—the intended analysis to be performed when adding interactive filters.
- Consider the real estate available on the screen with adding filters to worksheets and dashboards.
- Drop-downs and wildcard options create "low profile" interactive filters that save space, but lists might be easier for people to use.
- Hiding an interactive filter does not remove the filter from the data.

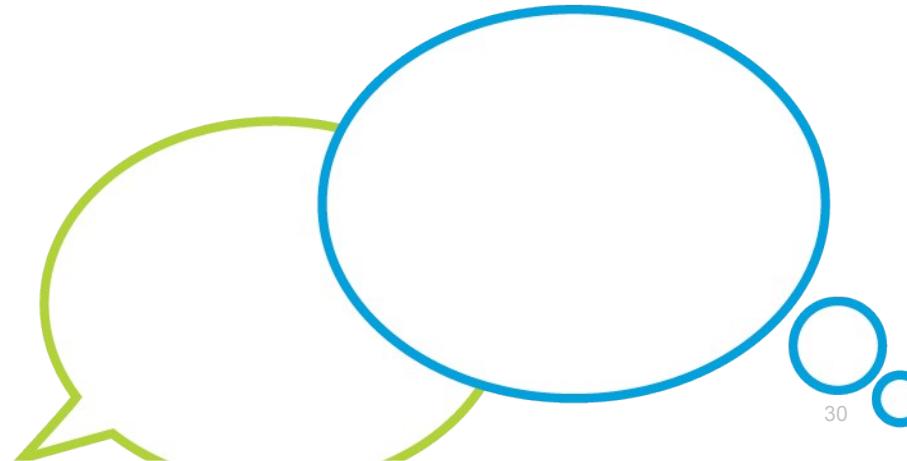


## Creating Interactive Filters

# Reflective Questions



1. What type of interactive filters might you use in your visualizations?
2. Why might you use a data source filter versus a worksheet filter?



# Customizing Visualizations



- Format and Annotate Views
- Emphasize Data in Visualizations
- Create Animated Workbooks
- Best Practices for Visual Design



# Topic A

## Format and Annotate Views

# Tableau Formatting Options



The screenshot shows the Tableau desktop application interface. At the top, the menu bar includes File, Data, Worksheet, Dashboard, Story, Analysis, Map, Format, and a gear icon. Below the menu is a toolbar with icons for refresh, undo, redo, and other functions. A floating window titled "Format Workbook" is open, containing sections for Fonts, Lines, and Marks. The "Fonts" section is expanded, showing settings for All (Tableau Book), Worksheets (Tableau Book, size 9), Tooltips (Tableau Book, size 10), Worksheet Titles (Tableau Light, size 15), Dashboard Titles (Tableau Book, size 18), Story Titles (Tableau Regular, size 18), and Less. The "Lines" section shows settings for Grid Lines. To the right of the "Format Workbook" window is a "Marks" pane with options for Square, Color, Size, Label, Detail, and Tooltip, each with corresponding icons. At the bottom of the Marks pane, there are two green callout buttons labeled "SUM(Sales) Δ".

**Format pane**

**Access formatting options**

# The Format Pane



Element to Format	Formatting Options
Fonts	Set the font, style, size, and color for the worksheet, pane, header, tooltips, title, totals, and grand totals in the panes and headers.
Alignment	Adjust the alignment for default text, totals, and grand totals so it best fits in the visualization.
Shading	Adjust background shading for the pane and headers for totals, grand totals, row bandings, column banding, and the worksheet.
Borders	Set borders surround the cells, panes, and headers in the view.
Lines	Set the appearance of lines in the view such as grid lines, zero lines, trend lines, reference lines, drop lines, axis lines, and tick marks.



- **Fields and field labels.** For example, to set fonts, color, and bolding.
- **Numbers and null values.** For example, to set numbers to display as currency, set the number of decimals, and to call out null values.
- **Titles, captions, tooltips, and legends.** For example, to color code or call attention to specific portions of the view.
- **Filter and parameter cards.** For example, to call attention to these cards to facilitate analysis.

# Transparent Worksheets



You can also make entire worksheets transparent. To make a worksheet transparent:

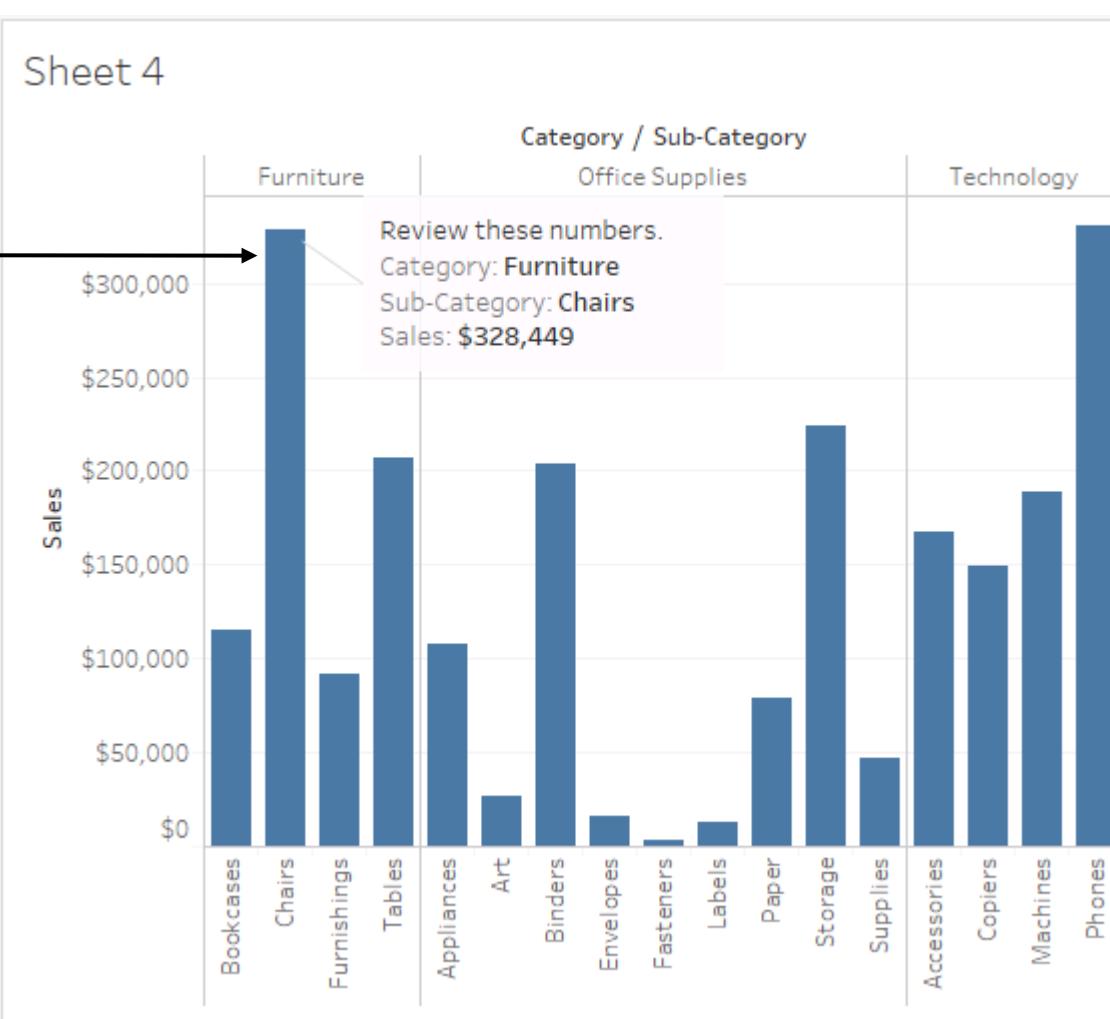
- For a single worksheet, select the worksheet and from the menu, select **Format**.
- On a dashboard, you can set the opacity to zero by opening the **Dashboard** layout pane and setting the worksheet opacity to zero.
- For a map, select the worksheet with the map in the viz, and in the **Formatting** pane, set both the worksheet and **Pane** background color to **None**.

# Options for Copying and Pasting Formatting



- You can copy formatting from one worksheet and paste it into other worksheets.
- You can copy any formatting options that can be configured in the **Format** pane except reference lines and annotations.
- Things like manual sizing and level of zoom are not copied either.

# Annotations



# Format Tooltips



- Tooltips are details that appear when you rest the pointer over one or more marks in the view.
- You can format tooltips to customize each one to be aligned with its field or dimension.
- You can use tooltip information to highlight differences inside of a single dimension without altering the construction of the view.

# Options for Editing and Formatting Axes



- Change its range.
  - This sets a range for the axis and can focus the view on data points that you wish to examine, or to ranges where the majority of your data exists.
- Change its appearance.
  - Axis titles are generated automatically based on field names.
  - You can change the title and add a subtitle.
  - You can also set the scale of the axis, and choose to use a logarithmic scale or to reverse the axis.
- Format tick marks.
  - You set how often both major and minor tick marks are displayed on the axis.
  - You can set automatic or fixed tick marks or have none at all.
- View negative values on log arithmetic axis.
  - If you have distributions that are skewed, you can opt to show negative values on a logarithmic scaled axis.



## Formatting and Annotating Views



# Topic B

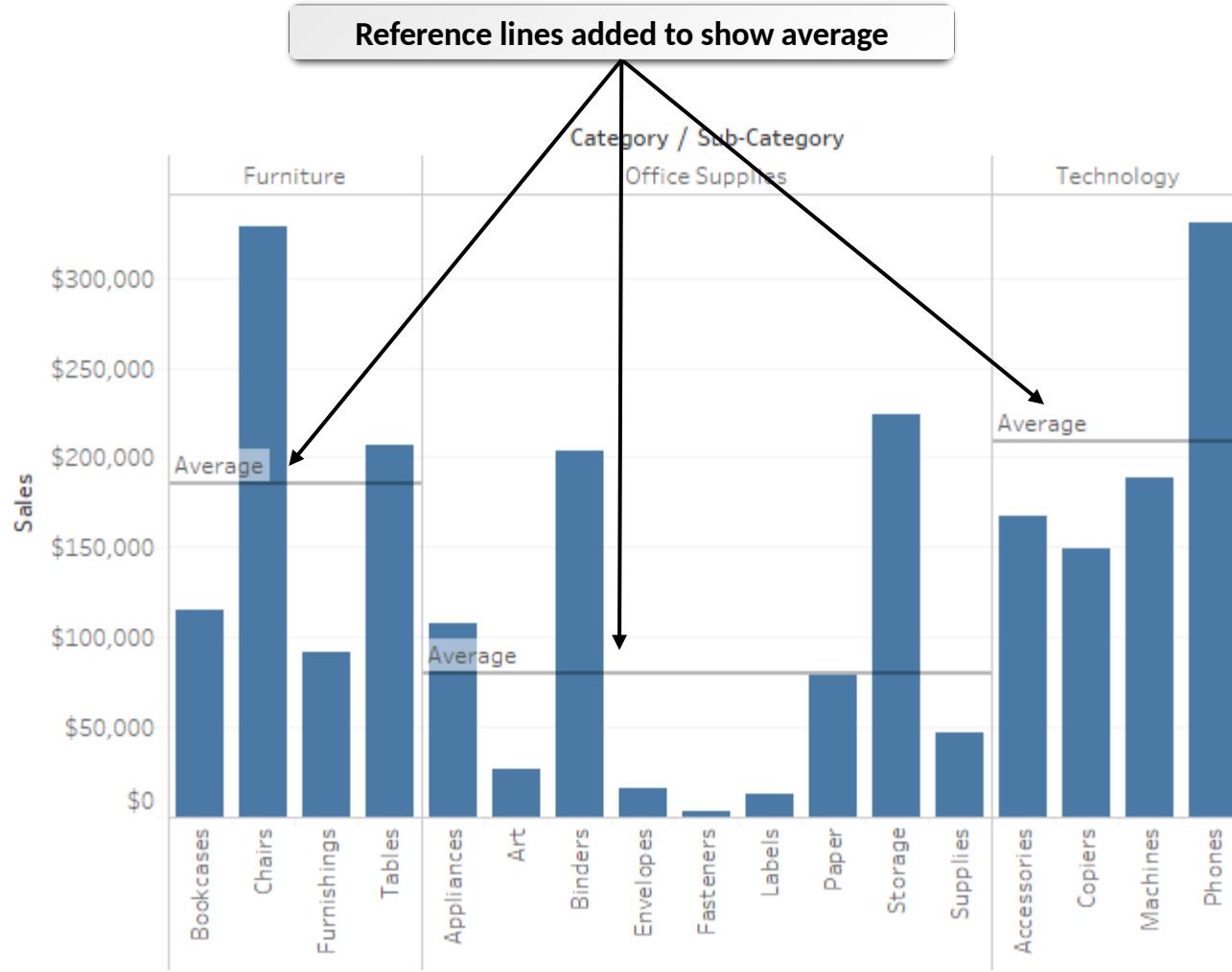
## Emphasize Data in Visualizations

# Options for Emphasizing Data



- **Reference lines:** Compare data to a specific point of reference.
- **Reference bands:** Appear as shaded areas behind marks that help show values that fall within a specific range.
- **Reference distributions:** Appear as a shaded gradient to show distribution along an axis.
- **Box plots:** Also known as whisker charts, box plots are a standard way of showing the distribution of values along an axis.
- **Drop lines:** Extend from a mark to an axis to accentuate the position of the mark in the view.
- **Trend lines:** Display an increasing, decreasing, or steady state, based on the data patterns.
- **Highlight actions:** To call attention to certain marks or elements of the view.

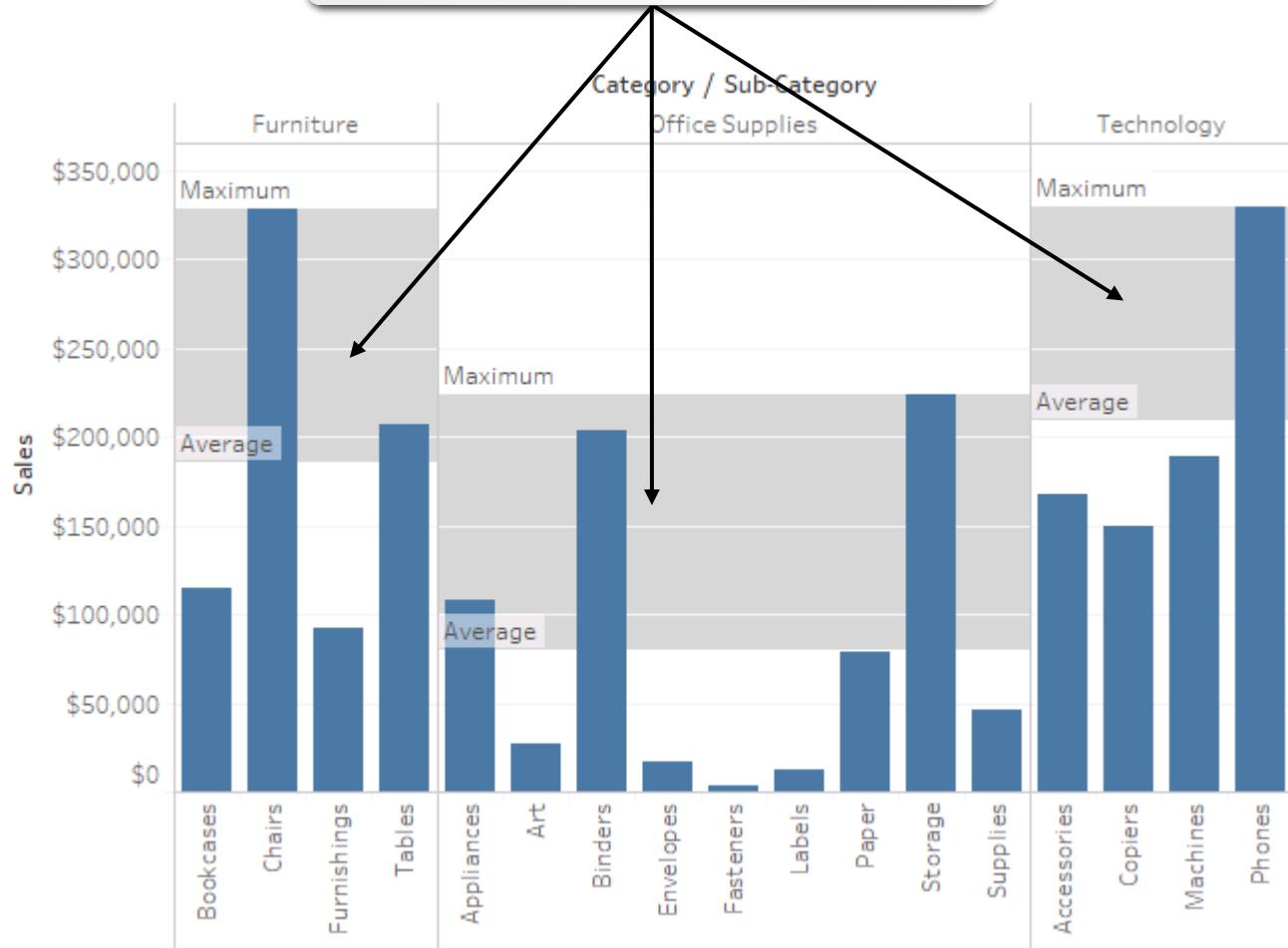
# Reference Lines



# Reference Bands



Reference bands added with fill to show average to maximum sales



# Customizable Tooltips for Reference Lines and Bands



Edit Reference Line, Band, or Box X

Line  Band  Distribution  Box Plot

Scope  Entire Table  Per Pane  Per Cell

Band From

Value: SUM(Sales)  Label: Computation

Tooltip: Automatic

Band To

Value:  Label: Computation

Tooltip: Automatic

Formatting

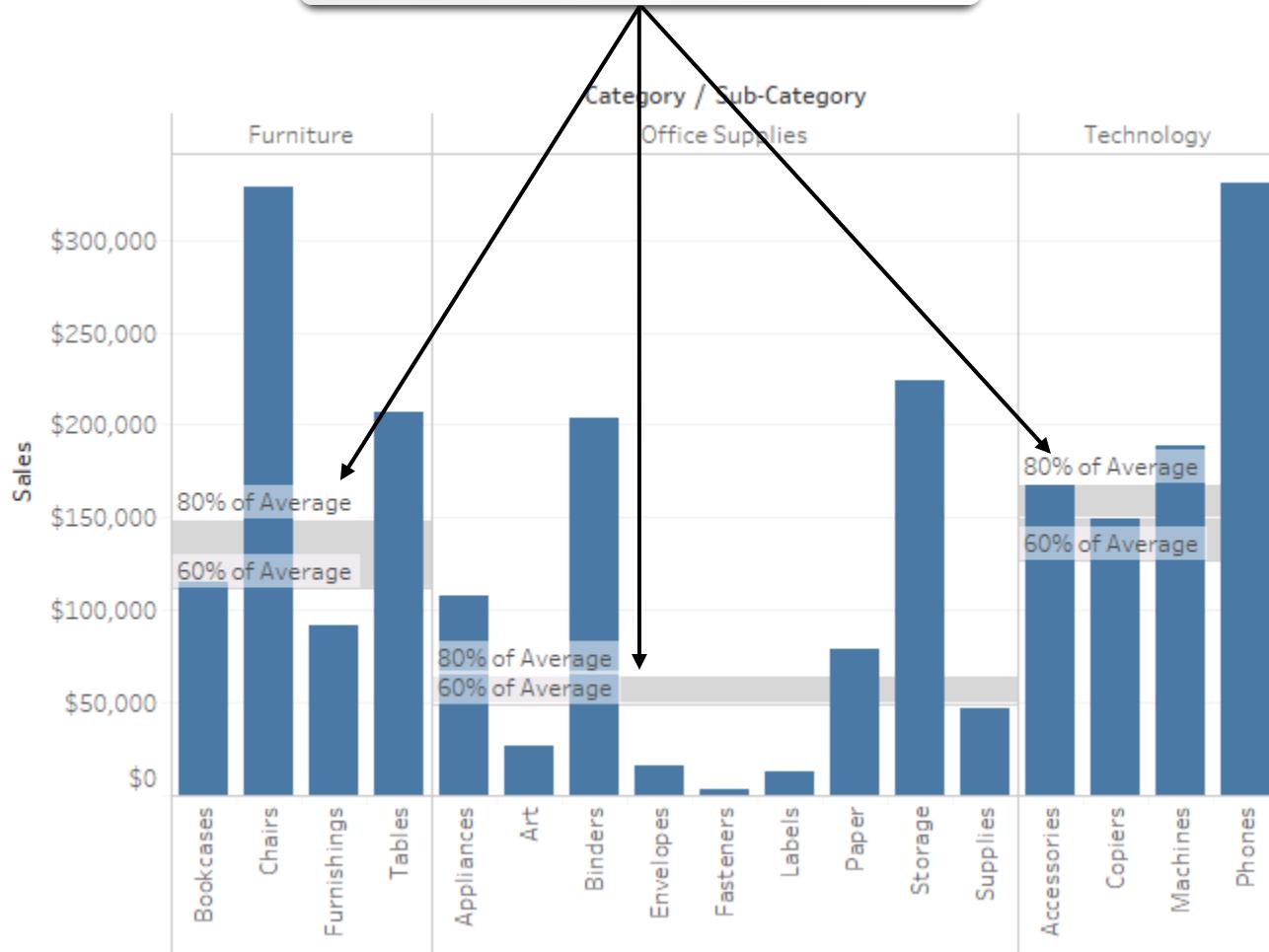
Line: None  Fill:

Show recalculated band for highlighted or selected data points

# Reference Distributions



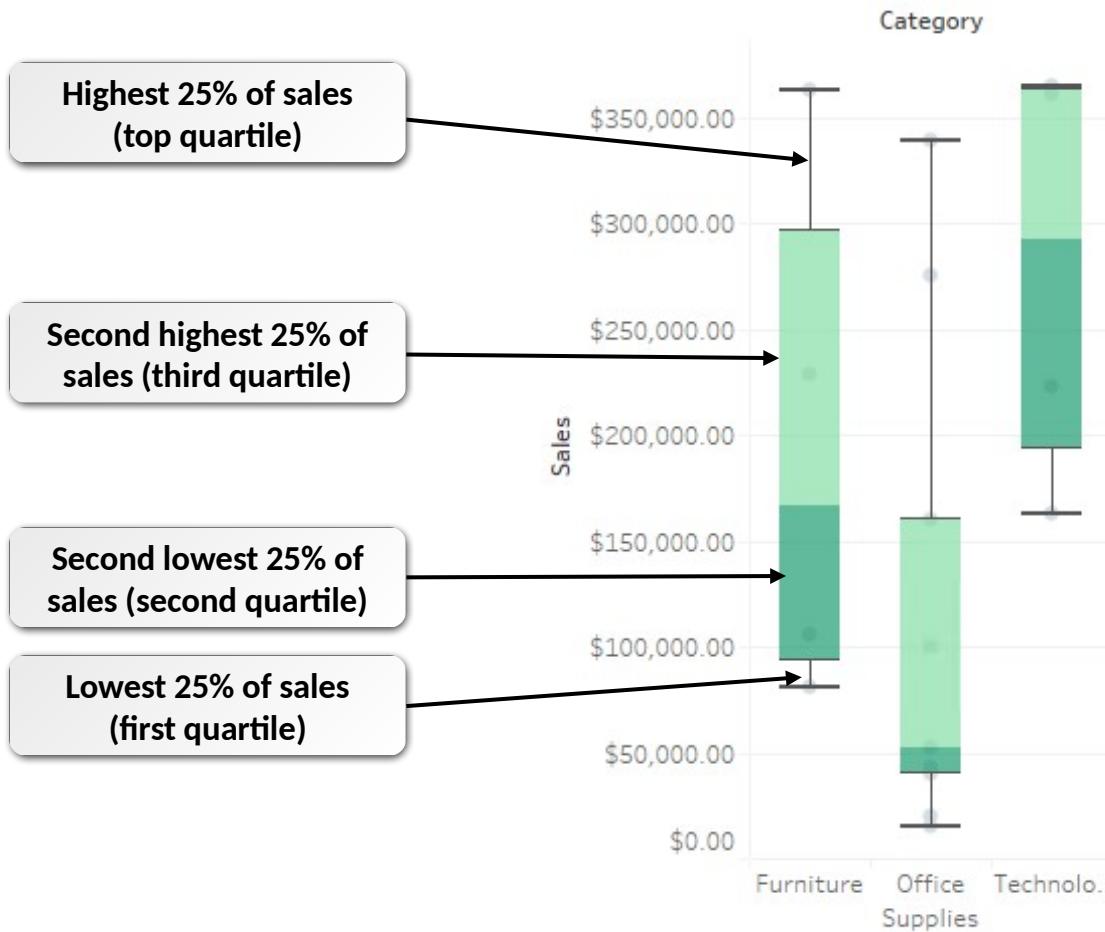
Reference distribution added showing  
60%-80% of average sales



# Box Plots



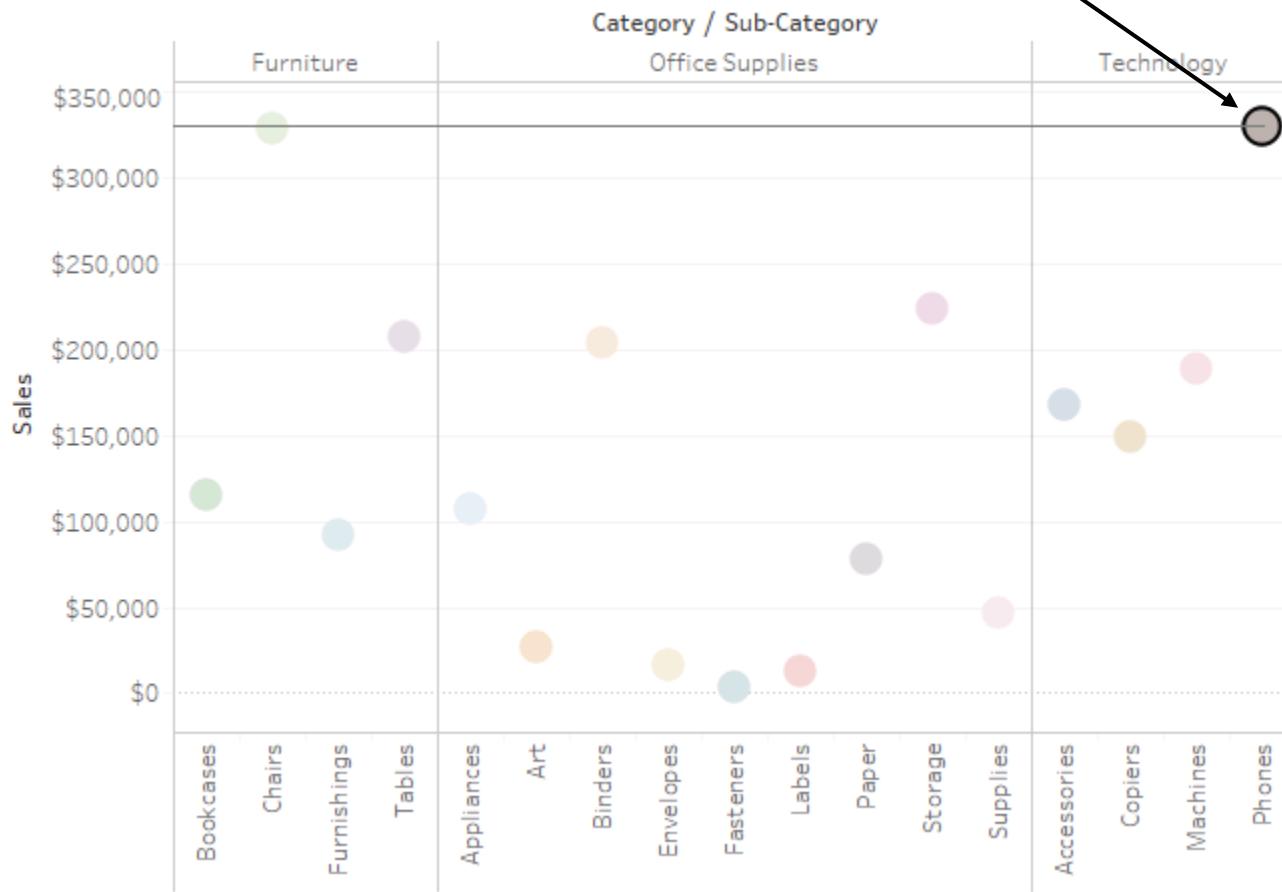
Sheet 1



# Drop Lines



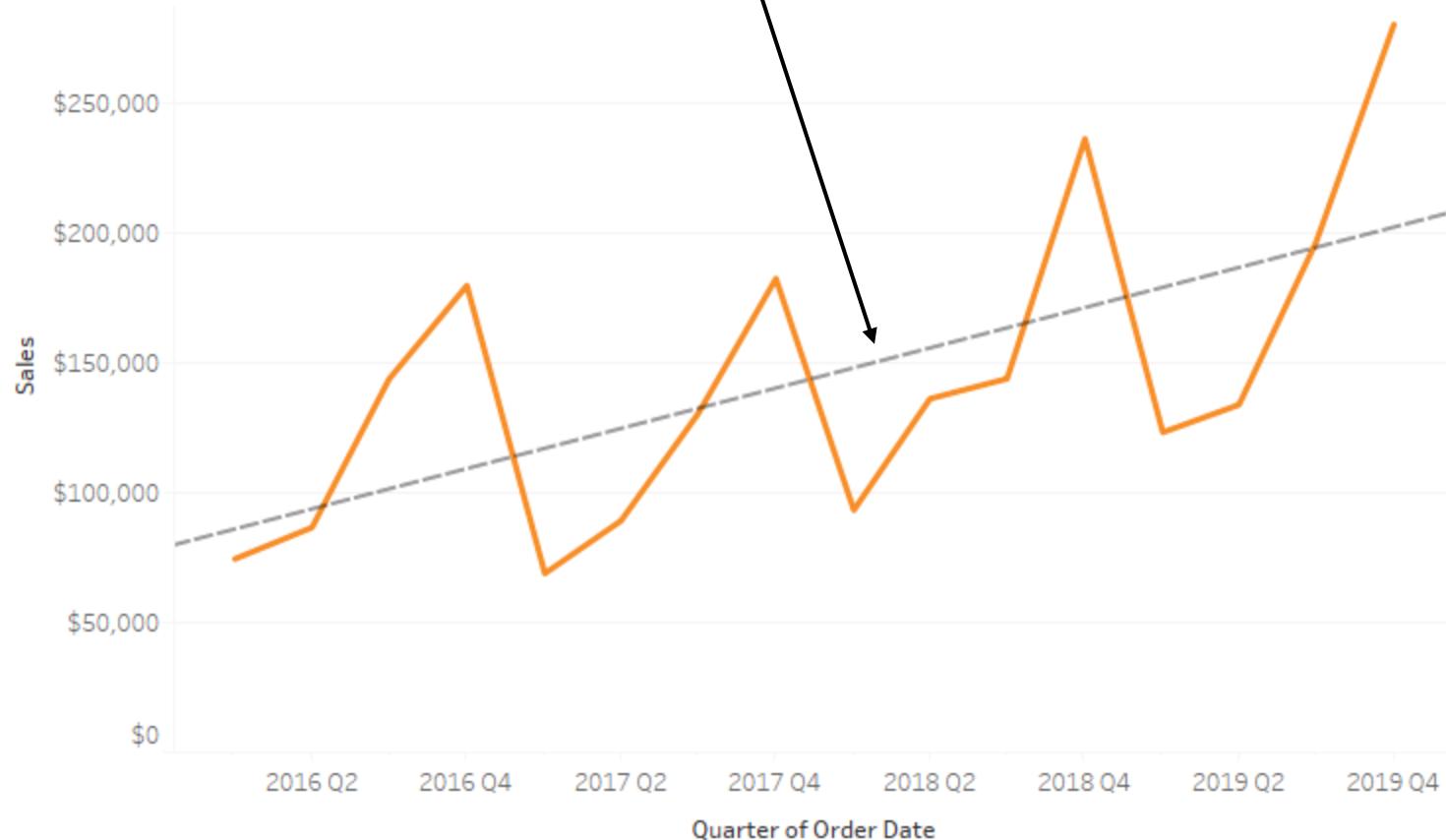
Drop line turned on to accentuate a data point



# Trend Lines



Trend line added to show sales trends for last four years



# Highlight Data in Tableau



Method	Description
Select Marks	Manually highlight a selection of marks and dim all other marks. This works well with a small amount of data.
Legends	Highlight data by selecting the legend so that related members in the view are highlighted and all others are dimmed.
Highlighter	Highlight a mark or a group of marks for a field in the view.
Actions	Allows you to create interactive exploration of data in a dashboard by specifying source and target sheets.



## Emphasizing Data in Visualizations



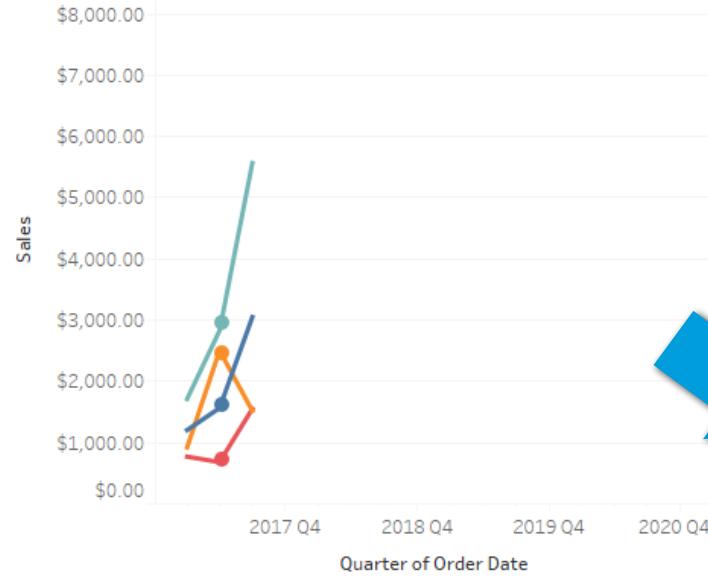
# Topic C

## Create Animated Workbooks

# Viz Animations



Quarterly Subcategory Sales - 2017 Q3



Region

- Central US
- Eastern US
- Southern US
- Western US

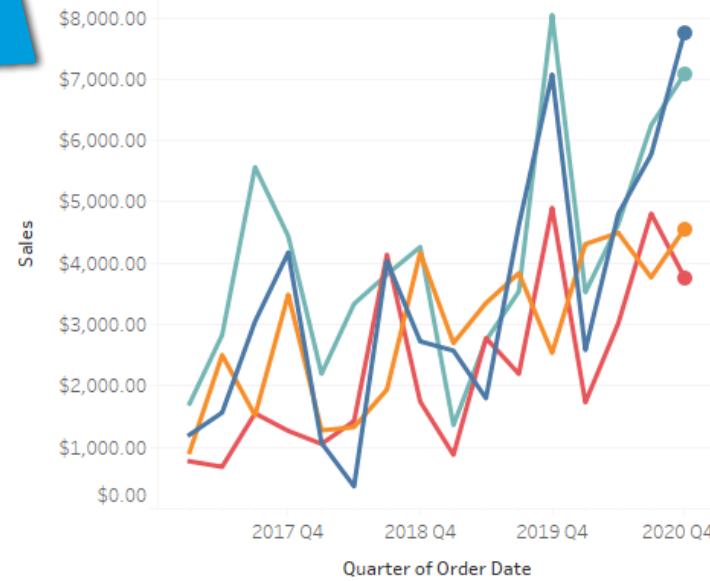
QUARTER(Order Date)

< 2017 Q3 >

Show history

This animated line chart draws the lines as it progresses through the quarters

Quarterly Subcategory Sales - 2020 Q4



Region

- Central US
- Eastern US
- Southern US
- Western US

QUARTER(Order Date)

< 2020 Q4 >

Show history

# Marks that Support Animation



The marks that currently support animation are:

- Bars
- Lines
- Circles
- Squares
- Shapes
- Density (Tableau Desktop only)
- Area
- Filled Maps
- Gantt
- Mark labels



The following actions taken in a worksheet where animations are turned on will generate an animation:

- Apply or change filters.
- Set a quick filter or parameter.
- Sort a viz.
- Change axis properties.
- Apply or change filter actions.
- Modify a measure via a calculation.
- Swap, add, or remove measures via a pill or shelf change.
- Use the page control (including the play button).



You can adjust the animation style on the **Animations** pane by choosing one of the following options:

- **Simultaneous.** This immediately places every animation.
- **Sequential.** This plays animations in a step-by-step sequence—exit, move, sort, enter.



You can choose from the following duration options:

- 0.30 seconds (Fast)
- 0.50 seconds (Medium)
- 1.00 seconds (Slow)
- 2.00 seconds (Very Slow)
- Custom



## Creating Animated Workbooks



# Topic D

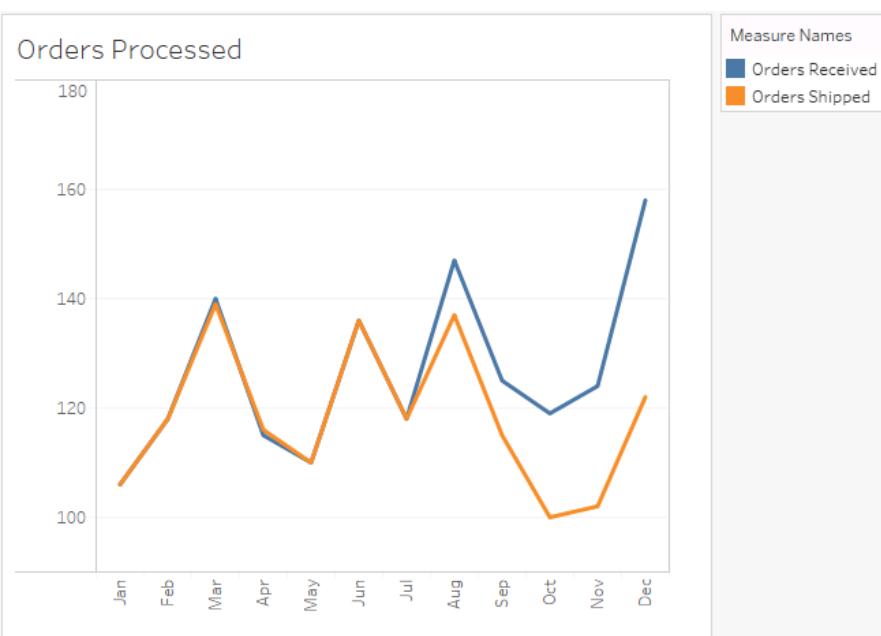
# Best Practices for Visual Design

# Explanatory vs. Exploratory Visuals



**Explanatory Visuals:** Present a focused message, and insight extracted from or backed up by the data, to make a point.

Original visual



Visual updated to best practices.

We need to hire one FTE



# Best Practices for Designing Explanatory Visualizations



- Determine your audience and the context in which the visual and data will be viewed.
- Create a story around your key message so it will be both more compelling and more memorable to the audience.
- Select the right visuals to show the message you're presenting.
- Have the title outline the main point of the visual.
- Design the visualization so that your audience can easily process the message.
- Focus attention on the areas of the visual that showcase the key message.
- Clean up the visual so extraneous elements don't interfere with the key message.

# Storytelling

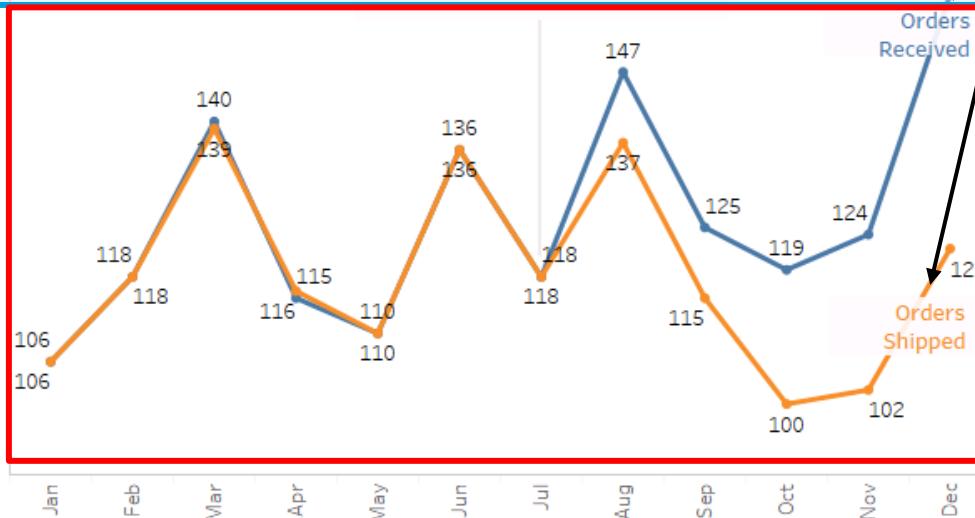


Headline

We need to hire one FTE

Narration

Annotations



Design



- Understand the audience that will consume the data on the chart.
  - Backgrounds
  - Biases
- Make sure insights and data are relevant to the audience.
- Consider the context in which the message is being delivered.
  - Do you need more, or less, detail to communicate effectively?
- How the audience perceives you.
  - Are you trusted by the audience, or do you have to build trust?
- Are you explicitly recommending action, or encouraging discussion?

# Visual Selection—What to Choose



Visual	Good For
<b>Text</b>	Sharing one or two numbers such as, "Sales rose 45%."
<b>Table</b>	Presenting data to an audience with mixed interest.
<b>Heatmap</b>	Highlighting specific data in a table to make a point.
<b>Scatterplot</b>	Showing relationships between two things.
<b>Line</b>	Showing chronological data and trends.
<b>Slopegraph</b>	Showing the relative increase or decrease between two points, such as time periods.
<b>Vertical bar</b>	Comparing smallest to largest and differences on the X axis.
<b>Horizontal bar</b>	Comparing smallest to largest and differences on the Y axis.
<b>Stacked vertical bar</b>	Comparing quantities and showing relative portions on the X axis.
<b>Stacked horizontal bar</b>	Comparing quantities and showing relative portions on the Y axis.
<b>Waterfall</b>	Separating subcomponents of a stacked bar to show event chronology.

# Visual Selection—What to Avoid



Visual	Reason to Avoid
Pie	Area charts in general should be avoided because it's very difficult for people to really tell which part of an area chart is taking up a larger area. Pie charts demonstrate this, as it is very difficult to tell the difference when slices of the pie are of similar size.
Donut	Donut charts suffer from the same issue as pie charts; it's not easy to determine relative sizes when they are close in value.
All 3D charts	While 3D charts may look more elegant, they do a worse job at conveying information. They may push some key elements to the background and make others difficult to read.
Dual axis charts	With a dual axis chart, you're typically trying to make two points on a single chart, which diminishes the focus of each message and distracts the people consuming the chart.

# Design and Cleanliness

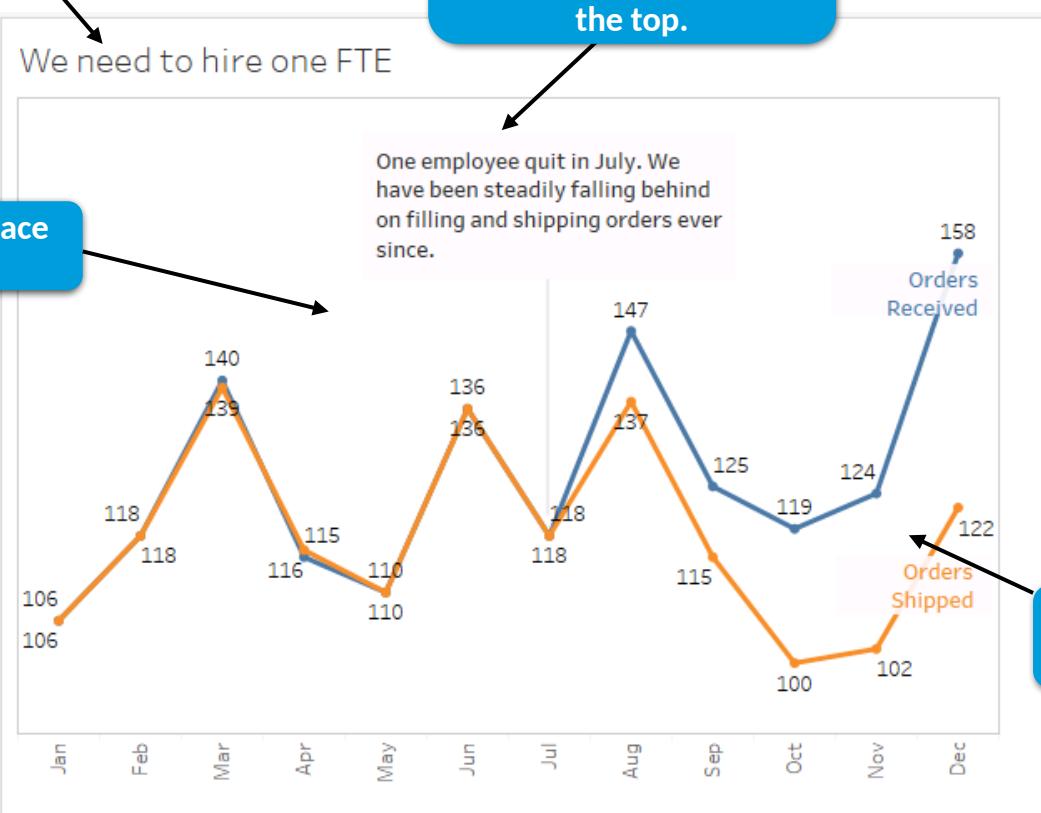


Headline left aligned.

Headline and annotation engage first and flow left to right at the top.

Good use of whitespace throughout.

Distinct and orderly visuals.

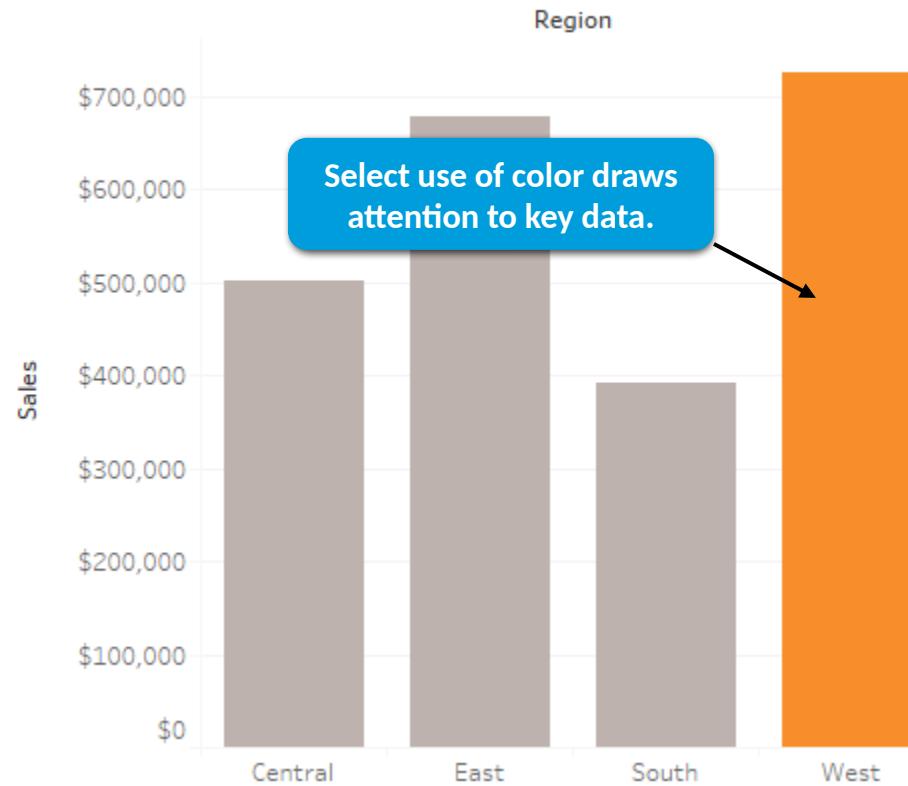


# Message Focus



High contrast  
headline stands out.

West Region Continues to Lead Sales



Select use of color draws  
attention to key data.

# Guidelines for Creating Explanatory Visualizations

## (Slide 1 of 2)



- Less is more; if the audience doesn't need an element to understand the visual, remove it:
  - Does the visual still convey meaning without gridlines? If so, leave gridlines out.
  - Do you need a legend? Can you remove the legend and use data labels instead?
  - How much precision do you need for axis labels?
  - Do the axes really need titles?
  - Do you need major and minor tick marks on the axes?
- Remove all clutter, and make sure the visual communicates the correct message.
- Create balance: Arrange the text, the visual elements to guide the eye to points that help make the key message.
- Make the meaning clear: Write a full sentence headline that asserts your main point.
- Make it large enough: Be sure the visual is readable by everyone in the audience.
- Use keywords and phrases: Audiences can grasp the information faster if it is provided in small amounts.

# Guidelines for Creating Explanatory Visualizations

## (Slide 2 of 2)



- Use color to clarify your visuals by focusing attention and organizing information.
- Avoid using the color red, as color blind people cannot interpret it.
- Choose two colors to accentuate key points and leave other visual elements gray.
- Show only key numbers on graphs: Round off numbers, label the axes according to an appropriate scale, and limit data to only the series necessary to make your point.
- Use two-dimensional visuals as three-dimensional visuals skew information.
- When creating a visual to be presented live, you can include less information on or with the visual as the presenter can provide that information during the presentation.

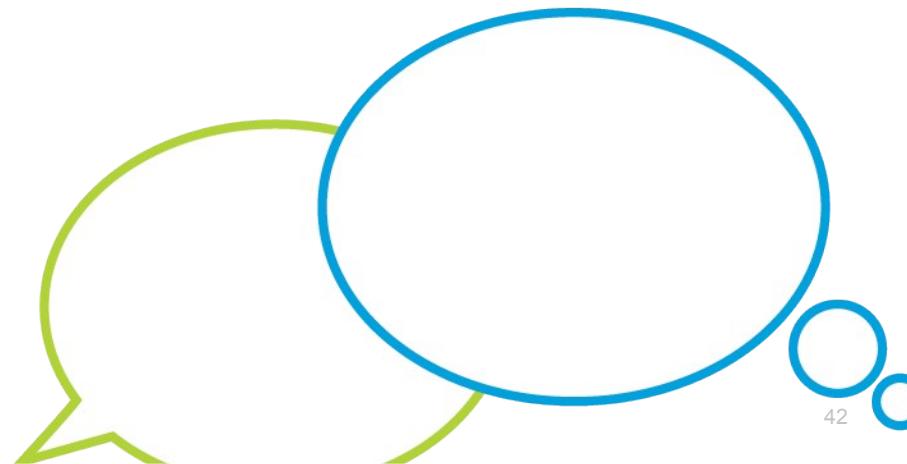


## Applying Best Practices in Visual Design

# Reflective Questions



1. What are a couple of reasons you can anticipate for including charts in your workbooks?
  
2. What are some of the best practices you plan to use when creating explanatory charts?



# Creating Dashboards in Tableau



- Create Dashboards
- Enhancing Dashboards with Actions
- Create Mobile Dashboards



# Topic A

## Create Dashboards

# Dashboards in Tableau



**Dashboard** Layout ▾

Default Phone

Device Preview

**Size** Automatic

**Sheets**

- 2019-20 Sales
- 2019-20 Sales...
- 2019-20 Sales...
- 2019-20 Sales...
- Sales-Subcate...
- Sales and Prof

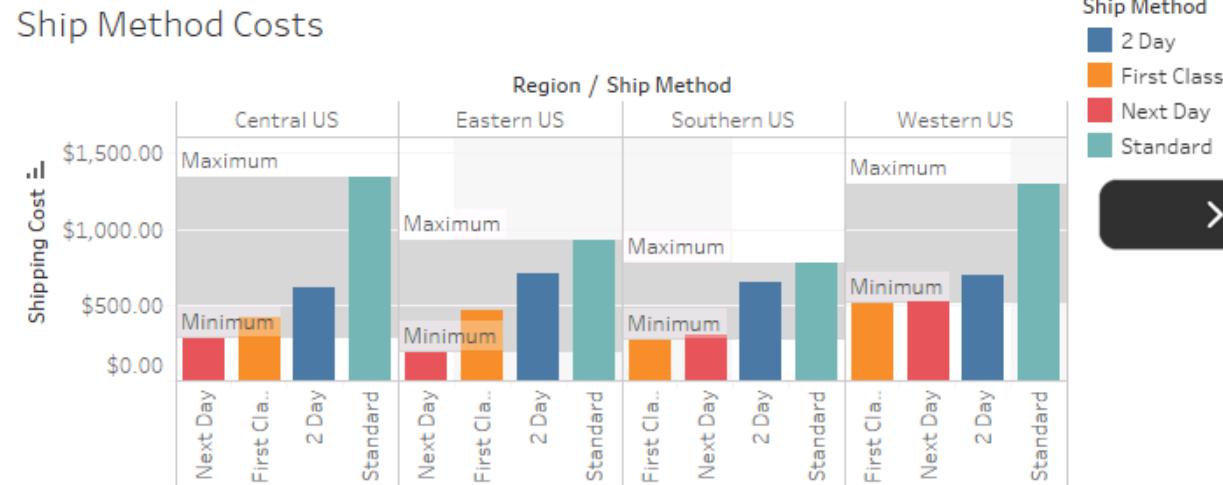
**Objects**

- Horizontal
- Vertical
- Text
- Image
- Web Page
- Blank
- Navigation
- Export
- Extension

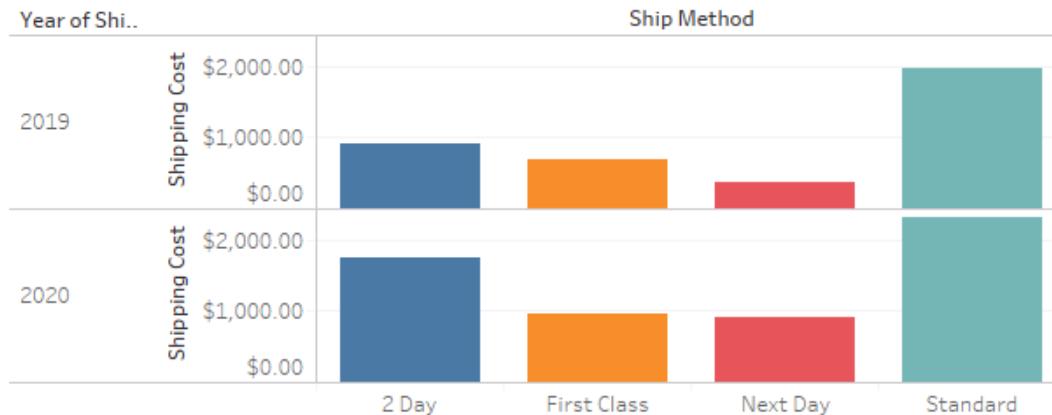
Tiled Floating

Show dashboard title

## Ship Method Costs



## Ship Method Costs by Year



# Dashboard Creation



The screenshot shows the Tableau Dashboard Creation interface. On the left, there's a sidebar with various settings:

- Dashboard**: Shows "Default" and "Phone" options, with "Device Preview" button.
- Size**: Set to "Desktop Browser (1000 x 800)".
- Sheets**: A list of available sheets:
  - 2019-20 Sales
  - 2019-20 Sales-Region
  - 2019-20 Sales-Category
  - 2019-20 Sales-Subcate...
  - Sales-Subcategory Line
  - Sales and Profit by Region
- Objects**: Options for adding objects:
  - Horizontal, Vertical
  - Text, Image, Web Page
  - Blank, Navigation, Export, Extension
- Layout**: Buttons for "Tiled" (selected) and "Floating".
- Show dashboard title

A blue callout box with the text "Dashboard Pane" points to the "Sheets" section. To the right of the sheets list, there's a placeholder area with the text "Drop sheets here".



You can select from the following options:

- **Fixed.** Select from a list of preset common dimensions or configure a custom size.
- **Automatic.** This is the default. This option will automatically fill the screen with the views placed on the dashboard.
- **Range.** Set a range to define minimum and maximum boundaries for the size of the dashboard.

# Dashboard Organization



**Dashboard**

Default Phone

**Size**

Automatic

**Sheets**

- 2019-20 Sales
- 2019-20 Sales-Region
- 2019-20 Sales-Category
- 2019-20 Sales-Subcate...
- Sales-Subcategory Line
- Sales and Profit by Region
- Product Sales Tree Map
- Sales Highlight Table
- Monthly Moving Averag...
- Sales by Subcategory

**Objects**

- Horizontal
- Vertical
- Text
- Image
- Web Page
- Blank
- Navigation
- Export
- Extension

Show dashboard title

**2019-20 Sales**

Order Date	2019	2020
2019	\$50,000.00	\$65,000.00
2020	\$0.00	\$65,000.00

**2019-20 Sales-Subcategory**

Category	Sub Catego...	Year of Ord..	2019	2020
Apparel	Men	2019	\$10,000.00	\$12,000.00
	Men	2020	\$12,000.00	\$15,000.00
	Women	2019	\$8,000.00	\$10,000.00
	Women	2020	\$10,000.00	\$12,000.00
Footwear	Youth	2019	\$2,000.00	\$1,000.00
	Youth	2020	\$1,000.00	\$2,000.00
	Hiking	2019	\$1,000.00	\$2,000.00
	Hiking	2020	\$2,000.00	\$4,000.00
Sports	Running	2019	\$10,000.00	\$12,000.00
	Running	2020	\$12,000.00	\$15,000.00
	Sandals	2019	\$5,000.00	\$7,000.00
	Sandals	2020	\$7,000.00	\$10,000.00
Youth	Youth	2019	\$10,000.00	\$12,000.00
	Youth	2020	\$12,000.00	\$15,000.00
	Baseball	2019	\$10,000.00	\$12,000.00
	Baseball	2020	\$12,000.00	\$15,000.00
Basketball	Basketball	2019	\$10,000.00	\$12,000.00
	Basketball	2020	\$12,000.00	\$15,000.00
	Football	2019	\$10,000.00	\$12,000.00
	Football	2020	\$12,000.00	\$15,000.00
Soccer	Soccer	2019	\$10,000.00	\$12,000.00
	Soccer	2020	\$12,000.00	\$15,000.00
	Tennis	2019	\$10,000.00	\$12,000.00
	Tennis	2020	\$12,000.00	\$15,000.00

**Sales-Subcategory Line**

**Gray highlight**

An arrow points from the text "Gray highlight" to a gray rectangular highlight on the line chart area.

# Dashboard Objects and Configuration



Object	Description
<b>Horizontal containers</b>	Adds a container structure to organize views one above the other.
<b>Vertical containers</b>	Adds a container structure to organize views side-by-side.
<b>Text</b>	Adds a text area to the dashboard.
<b>Image</b>	Adds an image to the dashboard.
<b>Web page</b>	Adds a web page to the dashboard.
<b>Blank</b>	Adds a blank area to use as a spacer for organization.
<b>Navigation</b>	Add a text or image link that allows users to navigate to other dashboards or worksheets.
<b>Download</b>	Allows users to download a PDF, PPT slide, PNG image, or crosstab of the dashboard.
<b>Extension</b>	Allows users to integrate the dashboard with applications outside of Tableau.
<b>Tiled</b>	Configuration option. Specify to use a tiled layout for the dashboard.
<b>Floating</b>	Configuration option. Specify to use a floating layout for the dashboard.
<b>Show dashboard title</b>	Configuration option to show a title at the top of the dashboard.

# Object Menus



The screenshot illustrates the use of object menus in Tableau. A blue callout labeled "Object menu" points to the menu icon (three horizontal lines) located at the top left of a bar chart. The bar chart has two bars representing the years 2019 and 2020. The chart is titled "019-20 Sales-Subca". A "Menu carrot" icon points to the right edge of the menu, which is titled "More options menu". The menu contains the following items:

- X
- Order Date
- Category
- Sub Catego..
- Year c
- Panel
- Men
- 2019
- Go to Sheet
- Duplicate Sheet
- Fit
- Title (selected)
- Caption
- Legends
- Filters
- Highlighters
- Show Page Control
- View Toolbar
- Use as Filter
- Ignore Actions
- Floating
- Select Container: Tiled
- Deselect
- Remove from Dashboard
- Rename Dashboard Item...

# Options for Fitting Views in Containers



- **Standard:** This includes the view with scroll bars and other navigational elements.
- **Fit width:** This forces the view to fill the entire available horizontal width related to other views on the dashboard.
- **Fit height:** This forces the view to fill the entire available vertical height related to other views on the dashboard.
- **Entire view:** This forces the view to fully fill the entire available horizontal and vertical area related to other views on the dashboard.

# Dashboard Filters



- By default, any filters brought in with a sheet that has been added to a dashboard apply only to the sheet it came from.
- You can make a filter apply to any view on the dashboard generated from that same data source.

# Options for Showing and Hiding Dashboard Containers



- Group views that are nice to have or options that viewers can then show or hide depending on how relevant those visuals are to them.
- Group filters, parameters, instructions, and legends into containers and allow viewers to hide the containers once used.
- This helps creators maximize precious screen real estate to display their visualizations.
- Only floating containers can have show/hide capability.
- Once you do, you can choose to enable a Show/Hide button.

# Dashboard Extensions



- Dashboard extensions allow you to integrate your dashboards with external data and applications.
- You can write your own extensions using Tableau's Extension API or choose from extensions published by providers in the Tableau Extensions Gallery.
- Add extensions to a dashboard by downloading the extension from the gallery, or creating your own extension and having the extension files accessible.
- Then add the extension object to the dashboard and configure it by configuring it with the location of the extension files and follow any configuration steps

# Sheet Updates and Dashboards



- Changes made to views in the source worksheets will be reflected in dashboards that use the sheets.
- Likewise, changes made to the views in the dashboard will change the underlying worksheets.
- In many cases, it's a good idea to create a duplicate of a worksheet or workbook to use solely to build the dashboard.

# Guidelines for Creating Dashboards



- Consider duplicating sheets for use with dashboards as that allows you to maintain control of the views that will be applied to the dashboard.
- If the main goal of the workbook is to create a dashboard, hide the other worksheets and dashboards in the workbook so they don't distract from the dashboard.
- Consider the size of the dashboard on the devices that will access it.
- Draw out how the dashboard should look on paper to get a good idea of how you wish to organize your views.
- Conduct usability testing on a dashboard with a group of people who will use the dashboard to make sure it meets their needs.
- Complete the default (desktop) dashboard first, then create new layouts that are customized for tablets and smartphones.
- Stack objects in layouts designed for devices.
- Test device layouts on a number of devices to address any unforeseen issues.
- Consider ease of use issues when working with legends and filters on device layouts.



## Creating a Dashboard



# Topic B

## Enhance Dashboards with Actions

# Dashboard Actions



**Dashboard Actions.**

**Configured actions.**

**Configure actions.**

**Types of actions to configure.**

The screenshot shows the 'Actions' dialog box with the following content:

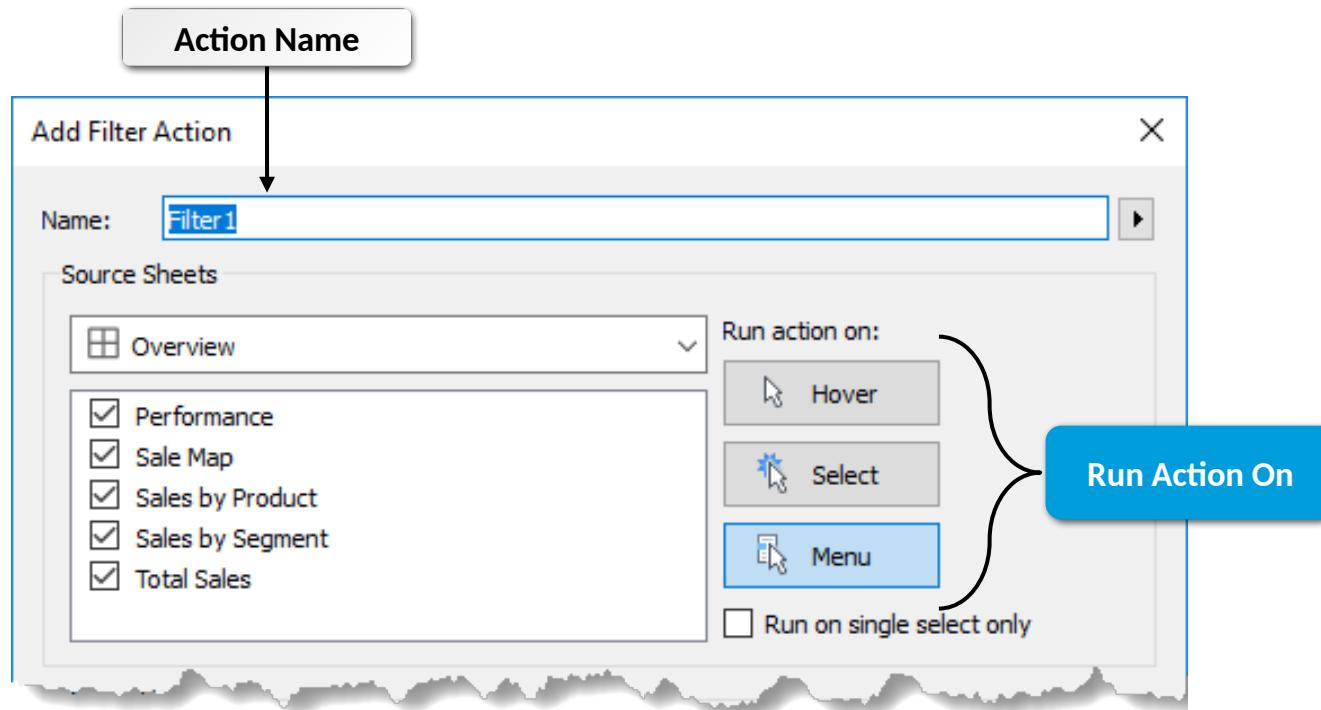
Name	Run On	Source	Fields
Filter Subcategory	Select	2019-2020 Subcategory Sal...	All
Highlight 1 (generated)	Select	2019-2020 Subcategory Sal...	YEAR(Order Date)
Highlight Subcategory	Hover	2019-2020 Subcategory Sal...	Sub Category

Below the table, there is a list of action types:

- Filter...
- Highlight...
- Go to URL...
- Go to Sheet...
- Change Parameter...
- Change Set Values...

Checkboxes for 'Edit...', 'Remove', 'OK', and 'Cancel' are also visible.

# Name and Run Action



# Source Sheets and Target Sheets



The screenshot shows a configuration interface for a dashboard. It is divided into two main sections: "Source Sheets" and "Target Sheets".

**Source Sheets:** This section is titled "Selected dashboard". It contains a dropdown menu set to "Overview" and a list of five sheets: Performance, Sale Map, Sales by Product, Sales by Segment, and Total Sales. All five items in the list have a checked checkbox.

**Target Sheets:** This section is titled "Target Sheets". It contains a dropdown menu set to "Overview" and a list of the same five sheets: Performance, Sale Map, Sales by Product, Sales by Segment, and Total Sales. All five items in the list have a checked checkbox.

**Annotations:**

- A callout bubble labeled "Selected dashboard" points to the "Selected dashboard" title in the Source Sheets section.
- A callout bubble labeled "Source sheets. Select the sheets on this dashboard that will activate the action." points to the list of sheets in the Source Sheets section.
- A callout bubble labeled "Target sheets. Select the sheets on this dashboard where the action will be applied." points to the list of sheets in the Target Sheets section.

# Filter Action



**Add Filter Action**

Name: **Filter by Selection**

Source Sheets:

- Dashboard 4
- 2019-20 Sales
- 2019-20 Sales-Subcategory
- Sales-Subcategory Line

Run action on:

- Hover
- Select
- Menu

Run on single select only

Target Sheets:

- Dashboard 4
- 2019-20 Sales
- 2019-20 Sales-Subcategory
- Sales-Subcategory Line

Clearing the selection will:

- Leave the filter
- Show all values
- Exclude all values

Target Filters:

- Selected Fields
- All Fields

Source Field	Target Field	Target Data Source

Add Filter... Edit... Remove OK Cancel

**Filter Name.**

Runs when an item in any source sheet is selected.

Fields that will be filtered.

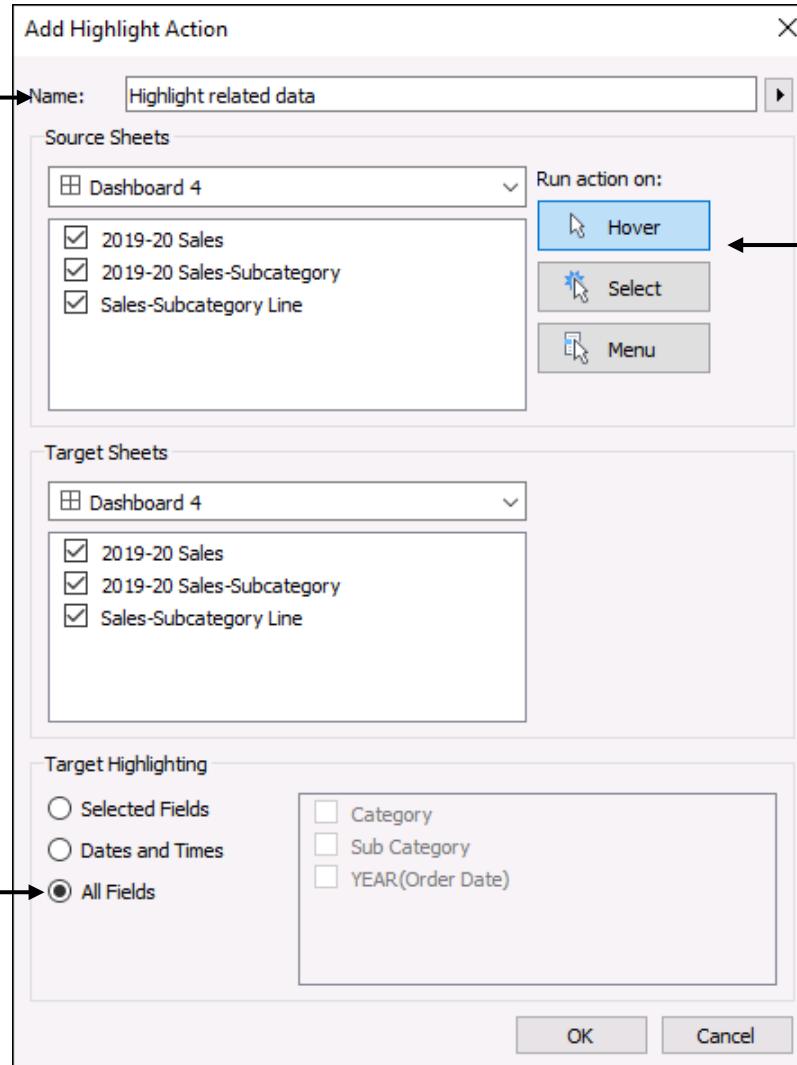
Action to take when the selection is deselected.

```
graph LR; A[Filter Name.] --> D[Add Filter Action Dialog]; B[Fields that will be filtered.] --> E[Source Fields]; C[Run action on: Select] --> F["Runs when an item in any source sheet is selected."]; G[Clearing the selection will: Show all values] --> H["Action to take when the selection is deselected."];
```

# Highlight Action



Highlight Name.



Runs when an item in any source sheet is hovered over.

Fields that will be highlighted in the target sheet.

# URL Action



Add URL Action

Name: Link to latest investor data report

Source Sheets

- Dashboard 4
- 2019-20 Sales
- 2019-20 Sales-Subcategory
- Sales-Subcategory Line

Run action on:

- Hover
- Select
- Menu

URL

URL to open: https://myfootprintsports/investordata/Lastest.pdf

Test URL: https://myfootprintsports/investordata/Lastest.pdf

Set URL encoding options:

- URL Encode Data Values
- Allow Multiple Values

Item Delimiter: ,

Delimiter Escape: \

URL Target

- New Browser Tab
- Web Page Object
- Browser Tab if No Web Page Object Exists

OK Cancel

Runs when the link is clicked in the tooltip.

**URL Action Name.**

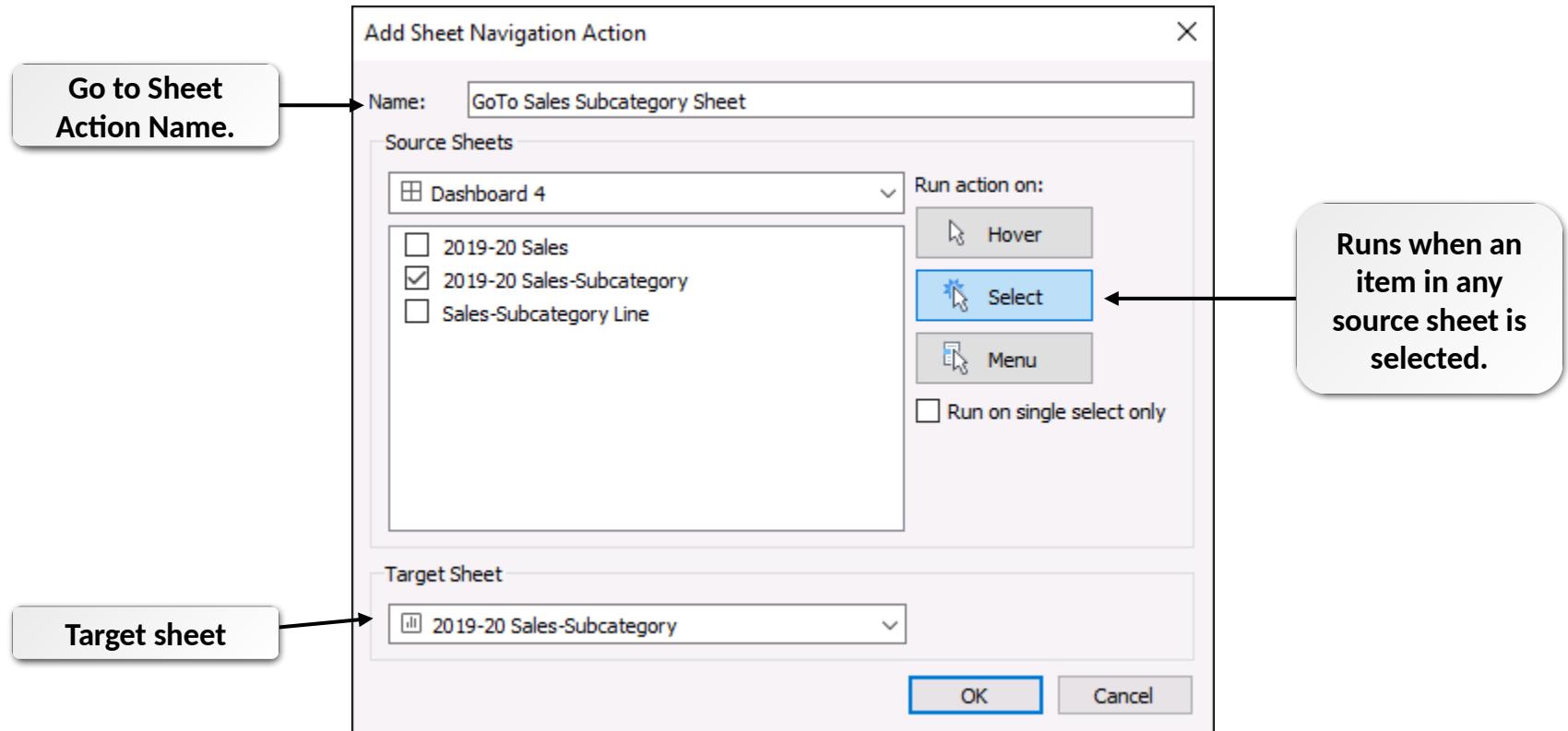
**URL to open.**

**Test URL**

**Set URL encoding options.**

**URL target options.**

# Go to Sheet Action



# Change Parameter Action



Add Parameter Action

Name: Change Top X to Average Sales

Source Sheets

- 2019-2020 Subcategory Sales Dashboard
- 2019-20 Sales-Subcategory
- Sales-Subcategory Line

Run action on:

- Hover
- Select
- Menu

Target Parameter

# Top X

Value

Field	Aggregation
# SUM(Sales) (MyFootPrintSport)	Average

OK Cancel

Parameter Action Name.

Parameter to target.

Value to change aggregation for

Runs when an item in any source sheet is selected.

# Change Set Values Action



**Set Values Action Name.**

**Name:** Change values in High Shipping Cost set

**Source Sheets**

- Shipping Costs Dashboard
- Ship Method Costs
- Ship Method Costs by Year

**Run action on:**

- Hover
- Select
- Menu

Run on single select only

**Target Set**

**Data Source:** MyFootPrintSports\_Orders Ex...

**Set:** High Shipping Cost

**Running the action will:**

- Assign values to set
- Add values to set
- Remove values from set

**Clearing the selection will:**

- Keep set values
- Add all values to set
- Remove all values from set

**OK** **Cancel**

**Runs when an item in any source sheet is selected.**

**Target data source.**

**Add values to set when action is run.**

**Target set.**

**Keep set values when selection cleared.**

# Actions in Tooltips: Run Action on Menu



- Adding actions that run on menu are an excellent way to add interactivity to tooltips.
- By including URLs or other actions, you add that power and flexibility to the tooltip.
- It's often useful to use actions in tooltips to allow users access to additional sheets with related data, or URLs with additional information.



## Enhancing Dashboards with Actions



# Topic C

## Create Mobile Dashboards



- The Tableau Mobile app is available on iOS and Android.
- App allows you to view data published on Tableau Server and Tableau Online.
- App allows you to select marks, apply filters, and drill-down using your finger.
- The app also makes it easy for you to keep up on the data you're most interested in.

You can:

- Make dashboards favorites
  - Subscribe to workbooks
  - Set alerts
- The app can be securely deployed with MDM, AppConfig, and VMware Workspace ONE.

# Device Designer



**Device Designer:** A tool in the **Dashboard** pane that lets you preview and create customized dashboard layouts for desktops, tablets, and smartphones.

The screenshot shows the Tableau Device Designer interface. On the left, there's a sidebar with 'Device Preview' and 'Layout' tabs, and dropdowns for 'Dashboard' (set to 'Dashboard') and 'Size' (set to 'Automatic'). Below the sidebar is a 'Device Preview' button. The main area is titled 'Device Preview' and shows a preview of a dashboard for 'Tableau Mobile app'. The dashboard contains two visualizations: a bar chart titled '2019-20 Sales' and a table titled '2019-20 Sales-Subcategory'. The bar chart has three bars: one blue bar for 'Apparel' and two orange bars for 'Men' (one for 2019 and one for 2020). The table shows data for 'Category' (Apparel), 'Sub Catego..' (Men), and 'Year of Ord..' (2019, 2020). A 'Preview Elements' callout points to the top right of the dashboard preview area.

# Mobile Layouts



**Dashboard**      **Layout**

**Default**      **Phone**           

**Size - Phone**

Default  
 Fit all  
 Fit width  
Height

**Layout - Phone**

2019-20 Sales  
 2019-20 Sales-Subcateg...

**Objects**

Horizontal       Blank  
 Vertical       Navigation  
 Text       Export  
 Image       Extension

### 2019-20 Sales

Order Date

Order Date	Sales
2019	\$55,000.00
2020	\$60,000.00

### 2019-20 Sales-Subcategory

Category	Sub Catego...	Year of Ord...
Apparel	Men	2019
		2020
	Women	2019
		2020
Youth	2019	
		2020
Footwear	Hiking	2019

# Layout Tab



Dashboard      Layout

**Selected item**  
Vertical

Show title

Floating

Position

x: 561      y: 8

Size

w: 160      h: 582

Border

None

Background

None

**Item hierarchy**

Dashboard 4

> Tiled

A screenshot of the Power BI 'Layout' tab settings. The 'Selected item' dropdown is set to 'Vertical'. Under 'Position', the 'x' value is 561 and 'y' is 8. Under 'Size', 'w' is 160 and 'h' is 582. The 'Border' dropdown shows 'None'. The 'Background' section has a 'None' option with a red circle containing a diagonal slash. In the bottom left, the 'Item hierarchy' shows 'Dashboard 4' with a 'Tiled' child item indicated by a right arrow and a tiled icon.

# Guidelines for Optimizing Dashboards for Mobile



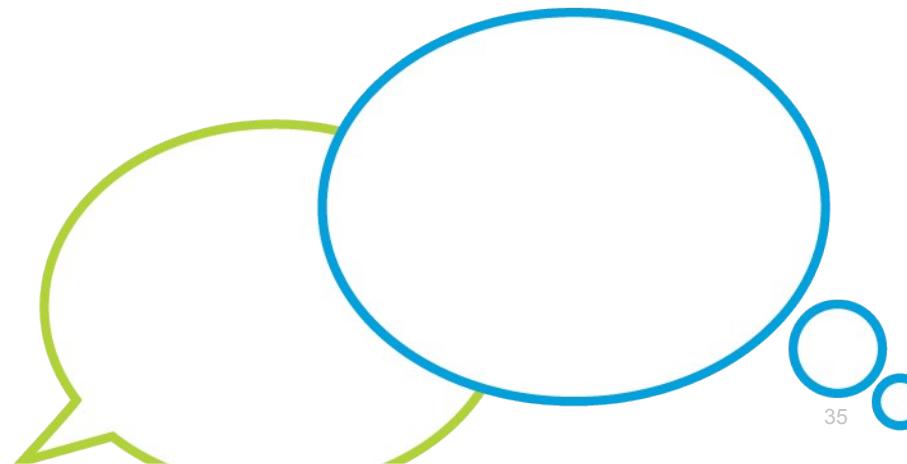
- Put filters above the charts that display what's filtered.
- You should design dashboards with the z-reading pattern in mind.
- Floating dashboards are converted to tiled in mobile layouts.



## Creating Mobile Dashboards



1. What types of actions might you use to enhance dashboard visualizations in your organization?
2. How might you use mobile dashboards in your organization?



# Creating Stories in Tableau



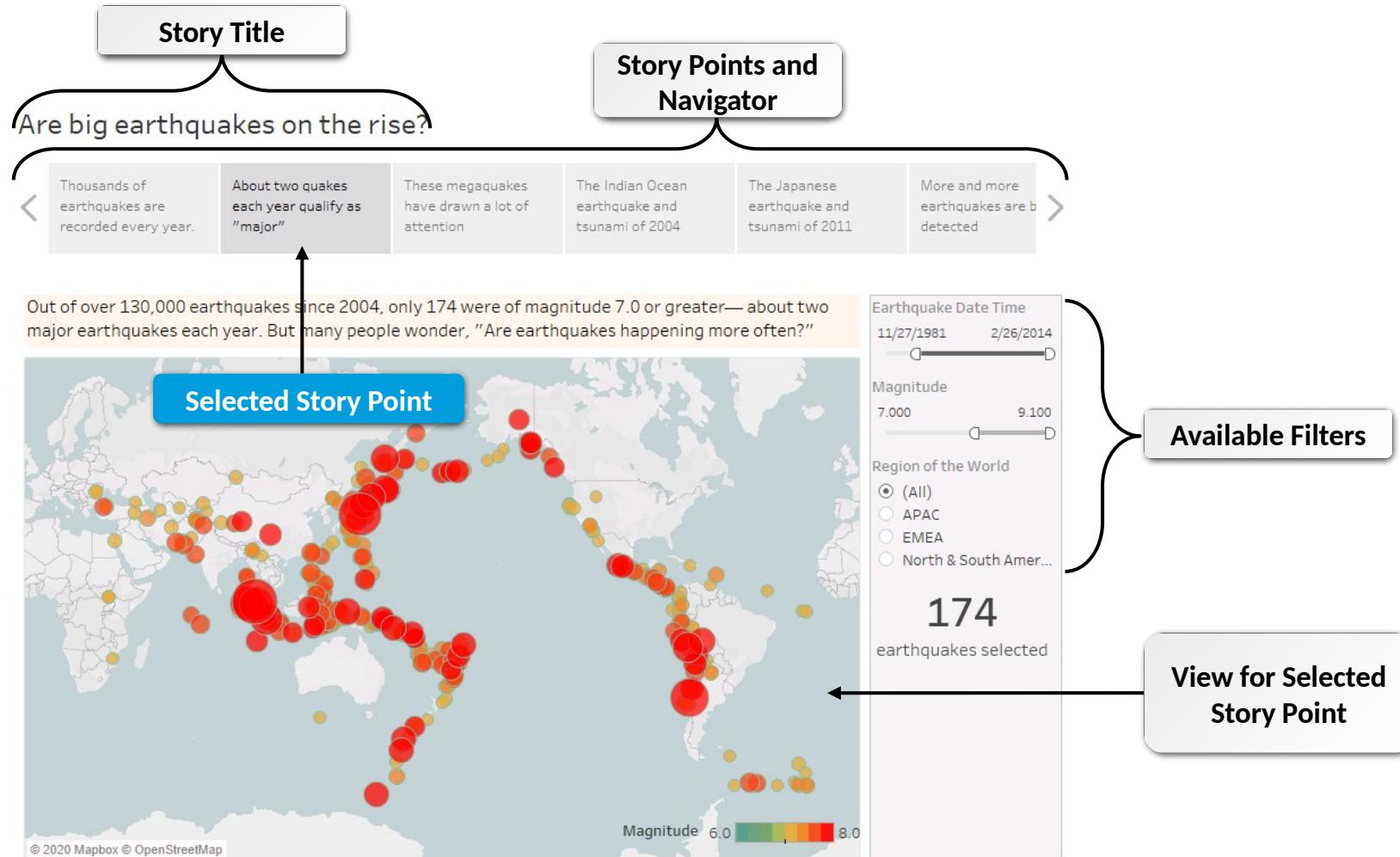
- Create Stories
- Enhance Stories with Tooltips



# Topic A

## Create Stories

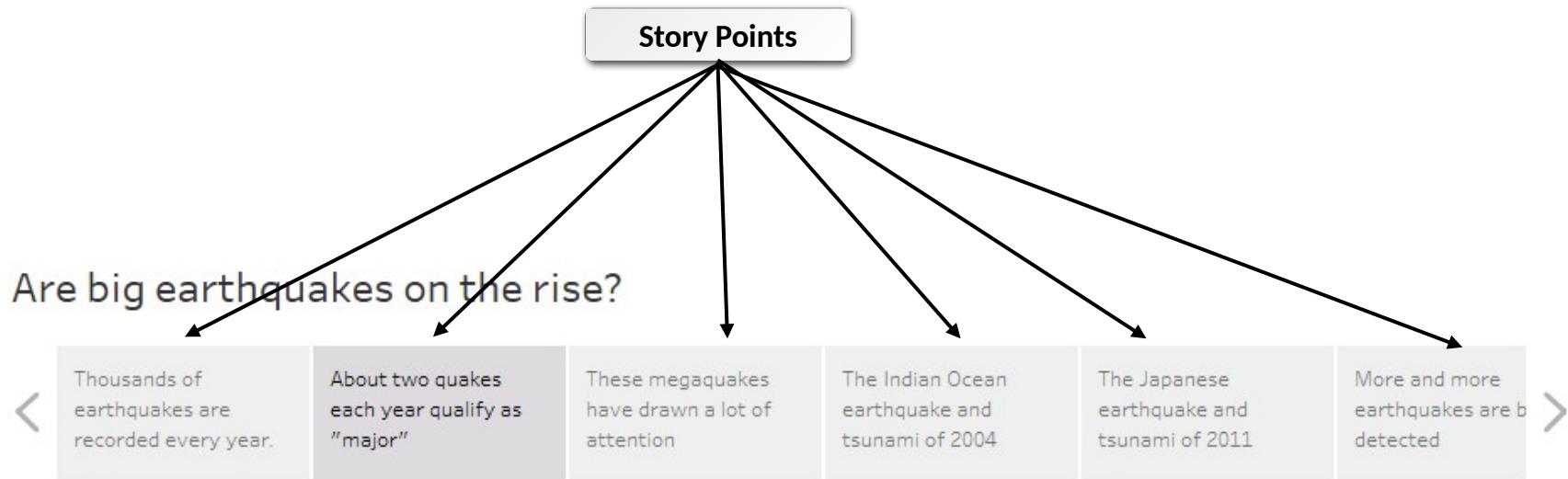
# Stories in Tableau



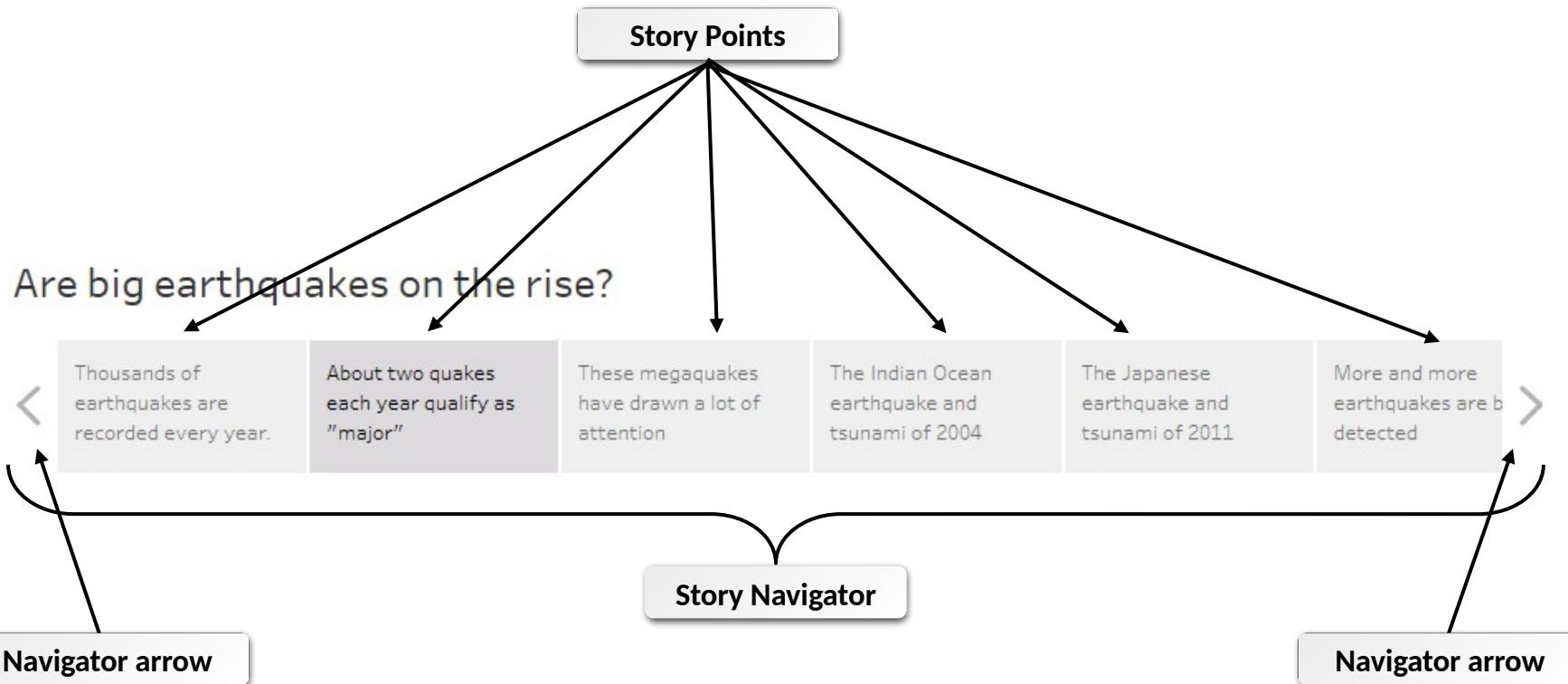
# Story Points



**Story Point:** A view from a worksheet or dashboard that has been added to a story, often with a caption. Each story point helps create and tell the story using data.



# Story Navigator



# Story Toolbar



**Story Toolbar:** A toolbar that lets you customize aspects of the story point such as setting filters or highlights, and duplicate story points.



# Sheet and Dashboard Data in Stories



- Any view added to a story connects to the underlying worksheet or dashboard it came from.
- Any changes made to a sheet or dashboard are reflected in the story as well.
- Any changes made to the sheet or dashboard in the story do not affect the source view.
- You can open sheets and dashboards used in a story from the story.
- You can see what dashboard and stories a worksheet is used in.

# Guidelines for Creating Stories



- Duplicate sheets for use with stories to maintain control of the views that will be applied to the story.
- For story-focused workbooks, hide the other worksheets and dashboards in the workbook so they don't distract from the story.
- Create a storyboard on paper to map out the story points of your story.
- Use the **Story** toolbar to take snapshots of story points in the configuration that best helps the data tell your story.



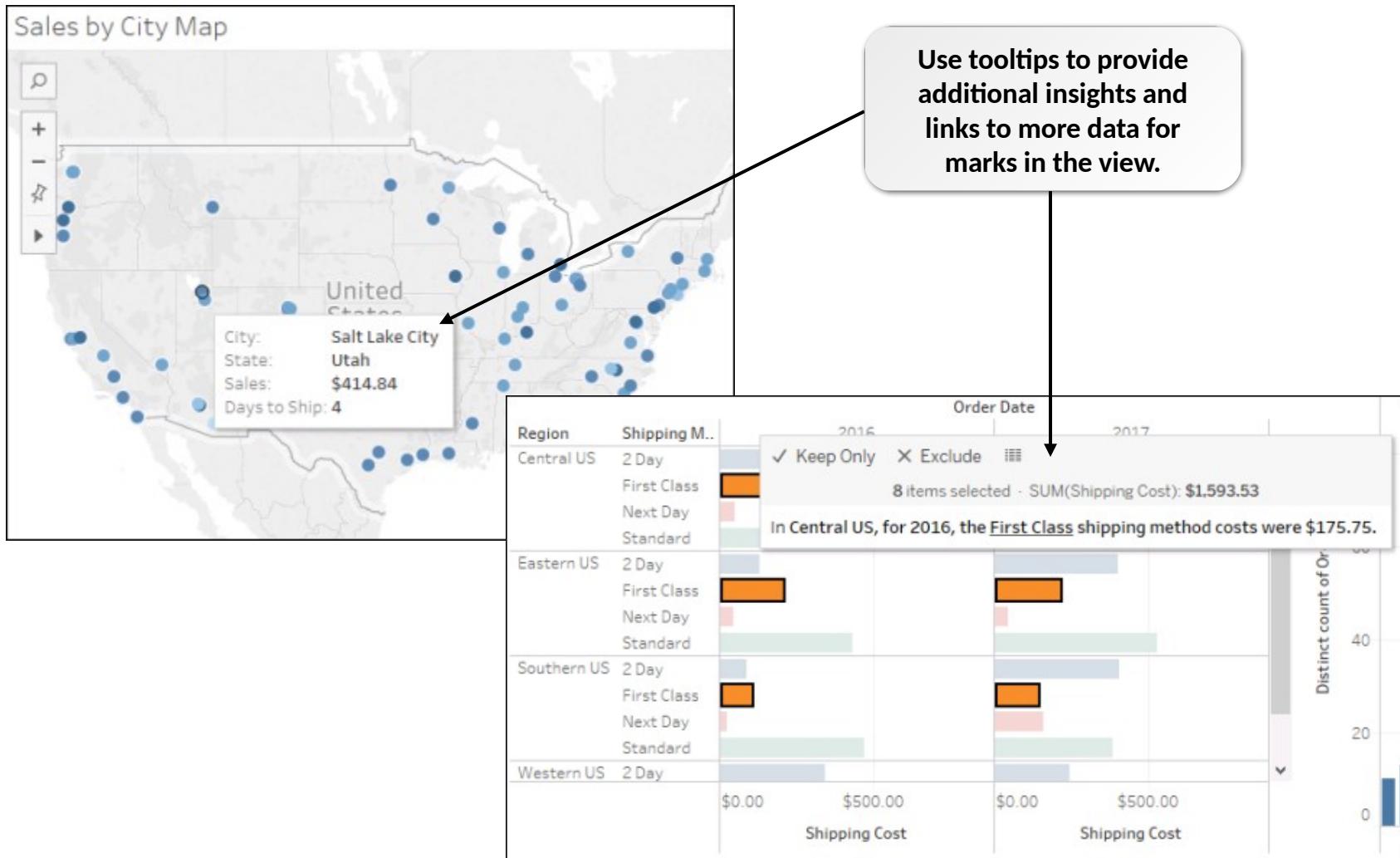
## Creating a Story



# Topic B

## Enhance Stories with Tooltips

# Storytelling with Tooltips



# Edit Tooltips



Insert fields and worksheets.

Format controls for text area.

Add and format text.

Govern when tooltips display.

Show or hide command buttons at top of tooltip.

Highlight related data for a field added to the text area.

Preview the tooltip.

Tableau Semibold 12 B I U Insert

<AGG(Sales above Target?)> - <Segment> <Category>  
<MONTH(Order Date)> <YEAR(Order Date)>  
Sales: <SUM(Sales)>  
Sales Target: <Sales Target Extract.SUM(Sales Target)>  
Difference: \$<AGG(SUM([Sales])-SUM([Sales Target].[Sales Target]))>

Show tooltips Responsive - Show tooltips instantly

Include command buttons

Allow selection by category

Reset Preview OK Cancel

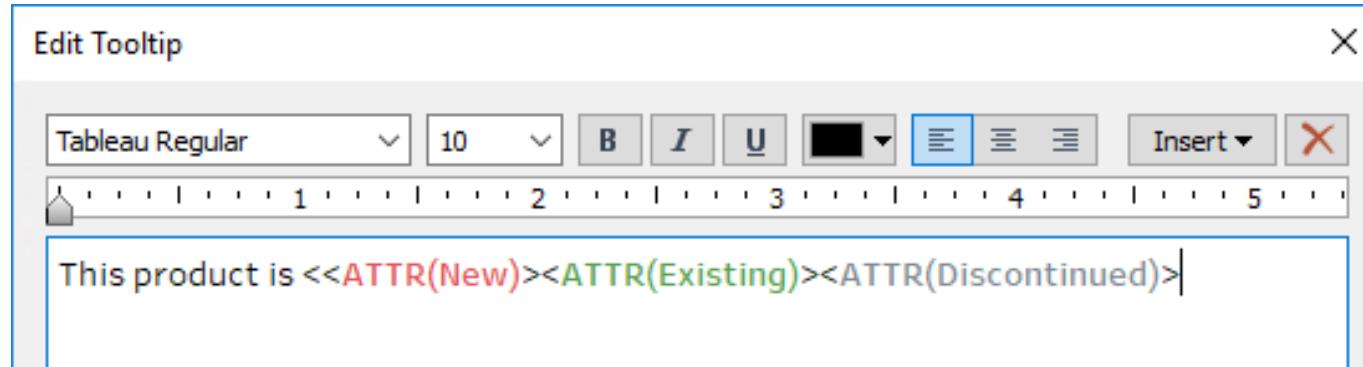
# Conditional Tooltips



Create a tooltip to show if a product is new:

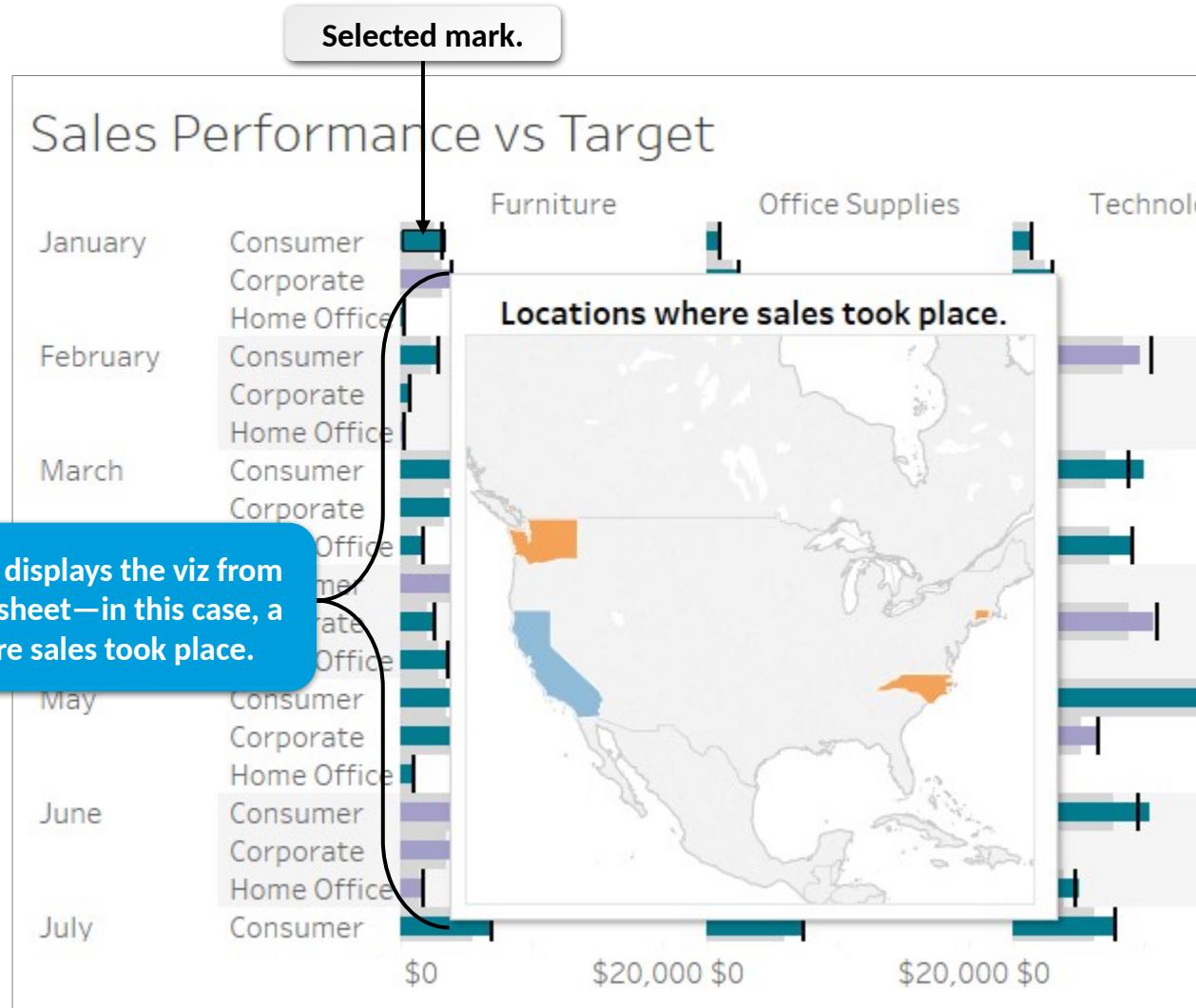
```
IF [Product Cycle] = "New"  
THEN [Product Cycle]  
ELSE ""  
END
```

This calculation returns true if the [Product Cycle] is "New." You can add similar calculated fields to identify "Existing" and "Discontinued" products.



Since only one of the product cycles can be true for each product, only one statement will return a result. The color selection for each option helps distinguish each.

# Viz in Tooltips





- You may run into issues getting secondary visualizations to display correctly in the tooltip.
- Some secondary visualizations may also be too large to be displayed, and you will receive the message, "View is too large to show."
- When you add a target sheet to a tooltip, the maxwidth and maxheight values are set at 300 pixels each.
- You can adjust these values by typing new ones in an embedded sheet statement.
- Tableau recommends not going over 600 pixels as that may obscure the primary source visualization.
- You can also adjust the view on the source data sheet to select **Entire View** and show more data from the target visualization in the tooltip.



## Enhancing Visualizations with Tooltips

# Reflective Questions



1. What types of stories might you create in your organization?
2. How might you use tooltips to enhance visualizations in your organization?

